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PRISM 30HSM HARDWARE ANALYSIS MODULE

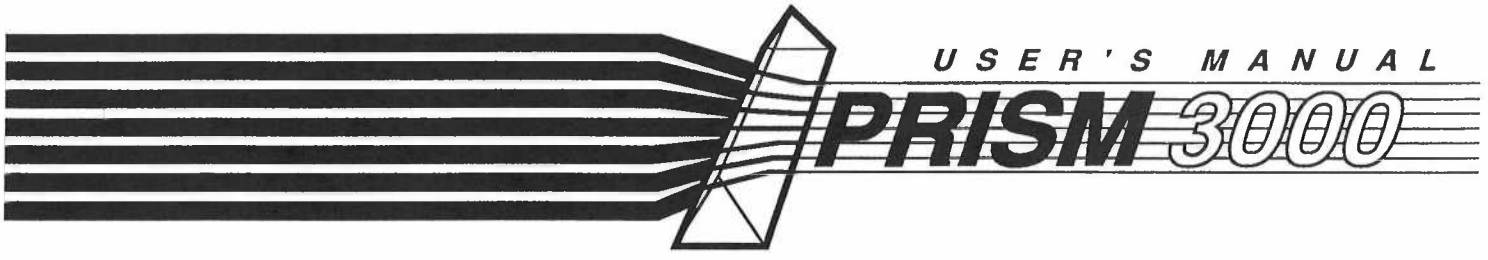

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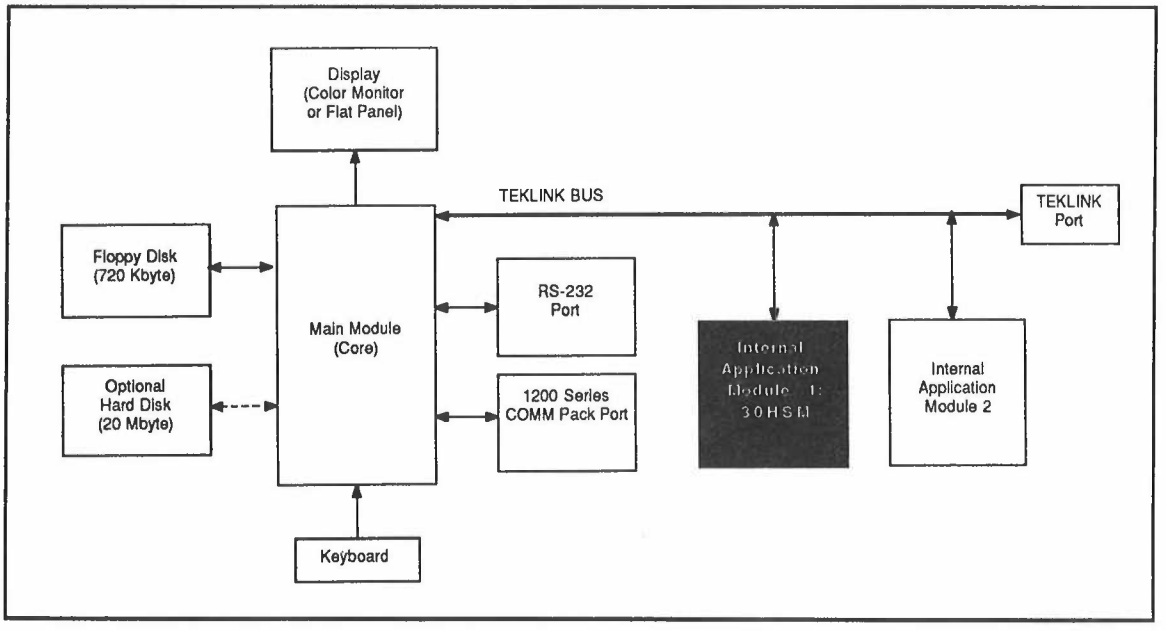
Table of Contents

List of Illustrations

List of Tables

Preface: A GUIDE TO PRISM 3000 DOCUMENTATION

PRISM 3000 Series documentation consists of a number of different manuals. These manuals provide you with all the information necessary to install, operate, maintain, and service any PRISM 3000 mainframe and associated application modules. The following figure provides an overview of the PRISM system. The shaded area in the figure represents the part of the system that is discussed in this manual.



Overview of PRISM 3000 System

The PRISM 3000 documentation consists of the following types of manuals:

- This **30HSM Application Module User's Manual** provides information on using the 30HSM Application Module. For more detailed information about the contents of this manual, see *How to Use this Manual* near the end of this preface.
- A **30MPM/30MPX user's manual** provides information on using the 30MPM/30MPX Application Module and the various microprocessor support options available for use with it.
- A **system user's manual** for each type of PRISM 3000 mainframe (3002 or 3001). These manuals include a basic introduction to operating the PRISM 3000 mainframe, a discussion of PRISM system-level menus, and reference information such as external device connection procedures, specifications, and a glossary of terms.
- A series of **reference guides** that briefly describe each PRISM menu.
- An online documentation package that consists of **Notes** that you can call up on the display screen to explain specific menu functions.
- A series of **application software user's manuals** that describe the various application software packages.
- A series of **microprocessor-specific mnemonic disassembly user's manuals** (designed to be used with the *30MPM/MPX Application Module User's Manual*). These options allow you to disassemble microprocessor signals into their assembly-language equivalents.
- A series of **microprocessor-specific prototype debug tool user's manuals** (designed to be used with the *30MPM/MPX Application Module's User's Manual*) that describe how to use the debug tools to troubleshoot your microprocessor-based prototypes.
- A series of **service manuals** that help qualified technicians maintain, troubleshoot, and repair PRISM 3000 series mainframes and application modules. These manuals also contain procedures for performing incoming inspections, verifying performance specifications, and making system adjustments.

HOW TO USE THIS MANUAL

If your PRISM hardware has not been set up, read and follow the installation procedures in Appendix A of your system user's manual.

This manual is designed to be used in conjunction with your system user's manual. Refer to that manual for answers to questions regarding all menu descriptions other than the Hardware Analysis Setup menu and the corresponding Channel Grouping and Qualify Storage submenus.

This manual comprises the following sections:

- **Section 1: Product Description**. Contains an overview of the 30HSM Application Module.
- **Section 2: Using the Hardware Analysis Module.** Contains details of the features of the Hardware Analysis Module.
- **Appendix A: Installing Software.** Contains information about installing software that comes with the 30HSM Application Module.
- **Appendix B: Specifications**. Contains electrical, mechanical, and environmental specifications for the 30HSM Application Module, the P6487 High-Speed Probe, and leadsets.
- **Appendix C: Options and Accessories**. Lists the available 30HSM Application Module options and accessories (both standard and optional).
- **Glossary**. Defines terms specific to the 30HSM Application Module and terms that pertain to logic analysis in general.
- **Index**. At the back of this manual, you will find an index to help you locate information on specific subjects in this manual.

GENERAL SAFETY SUMMARY

The general safety information in this summary is for operating and servicing personnel. Specific warnings and cautions can be found throughout the manual where they apply, and may not appear in this summary.

TERMS IN THIS MANUAL

CAUTION

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.

WARNING

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

TERMS AS MARKED ON EQUIPMENT

CAUTION indicates a hazard to property, including the equipment itelf, and could cause minor personal injury.

WARNING indicates solely a personal injury hazard not immediately accessible as you read the marking.

DANGER indicates a personal injury hazard immediately accessible as you read the marking.

SYMBOLS AS MARKED ON EQUIPMENT

DANGER—High voltage.

Protective ground (earth) terminal.

ATTENTION—REFER TO MANUAL.

GROUNDING THE PRODUCT

This product is intended to operate from a power source that does not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground.

WARNING: This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle. A protective-ground connection by way of the grounding conductor in the power cord is essential for safe operation. (I.E.C. Safety Class I)

DANGER ARISING FROM LOSS OF GROUND

Upon loss of the protective-ground connection, all accessible conductive parts (including knobs and controls that may appear to be insulated) can render an electric shock.

POWER DISCONNECT

The main power disconnect is by means of the power cord or, if provided, an ac power switch.

USE THE PROPER POWER CORD

Use only the power cord and connector specified for your product. Use only a power cord that is in good condition. CSA Certification includes the equipment and power cords appropriate for use on the North America power network. All other power cords supplied are approved for the country of use.

USE THE PROPER FUSE

To avoid fire hazard use only a fuse of the correct type, voltage rating, and current rating.

USE THE PROPER VOLTAGE SETTING

Make sure the line selector is in the proper position for the power source being used.

REMOVE LOOSE OBJECTS

During disassembly or installation procedures, screws or other small objects may fall to the bottom of the mainframe. To avoid shorting out the power supply, do not power-up the instrument until such objects have been removed.

DO NOT OPERATE WITHOUT COVERS

To avoid personal injury or damage to the product, do not operate this product with covers or panels removed.

USE CARE WITH COVERS REMOVED

To avoid personal injury, remove jewelry such as rings, watches, and other metallic objects before removing the cover. Do not touch exposed connections and components within the product while the power cord is connected.

REMOVE FROM OPERATION

If you have reason to believe that the instrument has suffered a component failure, do not operate the instrument until the cause of the failure has been determined and corrected.

DO NOT OPERATE IN EXPLOSIVE ATMOSPHERES

To avoid explosion, do not operate this product in an explosive atmosphere unless it has been specifically certified for such operation.

Section 1: 30HSM DESCRIPTION

The PRISM 3000 Hardware Analysis Module (30HSM) is a data acquisition module designed to sample data with a resolution up to 500 ps using the 2 GHz leadset. The Hardware Analysis Module comes equipped with two P6487 High-Speed Probes and two Standard leadsets. Using the Standard leadset, this module can sample data with a resolution of up to 2.5 ns (400 MHz). You can use the Hardware Analysis Module in any PRISM 3000 Series mainframe.

With the Hardware Analysis Application Module you can develop a simple yet powerful trigger test specification. There are fifteen trigger tests to help you solve a variety of problems that occur with high-speed hardware. Each test (located in the setup menu) can consist of one or two event recognizers, counters, timers, and intermodule TekLink signals. There are tests for:

- detecting specified bus values (an event)
- detecting specified bus values extended across several 30HSMs (a 21-bit or wider event)
- measuring the duration of specified bus values
- measuring the period (cycle rate) of a specified bus channel value
- accumulating the total time between a pair of specified bus values that occur and reoccur
- counting the number of times a specified bus value occurs
- accumulating the total time in which a single specified bus value occurs and reoccurs
- measuring the setup time between two specified bus values
- measuring the hold time between two specified bus values

The trigger test specification can consist of one or two tests that may be performed sequentially or concurrently. Trigger test selections work together to provide you with a powerful trigger machine. You can set the PRISM to perform a variety of actions based on the result of each test.

DATA SAMPLING SPEEDS

Data can be acquired using either one or two P6487 High-Speed Probes. Three types of leadsets are presently available for the P6487 probe: the Standard, the High Performance, and the 2 GHz leadset. Table 1-1 shows which 30HSM acquisition modes can be used with which leadsets and the maximum sampling speed associated with each combination. The P6487 High-Speed Probe is the only probe used with this module.

Table 1-1
DATA SAMPLING SPEEDS BY ACQUISITION MODES AND LEADSETS

30HSM Acquisition Mode	Leadset Used and Maximum Data Sampling Speed		
	Standard	High Perf.	2 GHz
High Resolution Mode	400 MHz	400 MHz	2 GHz
Dual-Threshold Mode	200 MHz	200 MHz	*N/A

*N/A means that the leadset does not operate in this acquisition mode.

Other features provided by the 30HSM module are as follows:

- data is transitionally stored in memory
- glitches as small as 1.5 ns are detected
- signals can be sent or received to or from other PRISM modules (TekLink) or devices (external trigger in/out)
- acquired data is time-stamped
- acquired data can be viewed in both State Table or Timing Diagram display menus with data from other modules (two or more modules acquiring data simultaneously). Refer to the mainframe user's manual for a description of the various display formats.

CONVENTIONS USED IN THIS MANUAL

This manual uses the following conventions:

- SUT refers to the system under test.
- An X represents Don't Care when designating logic level signal values.
- PRISM refers to any of the PRISM 3000 Series mainframes.
- HSM refers to either the 30HSM Hardware Analysis Module or to the 3001HSM Hardware Analysis Logic Analyzer.

Section 2: USING THE HARDWARE ANALYSIS MODULE

The 30HSM is an easy-to-use yet powerful high-speed data acquisition module. In this section you will find information about the HSM including:

- an overview of the Hardware Analysis setup menu
- descriptions of each specific trigger test
- directions on how to start acquiring SUT data with the HSM

The SUT's data rate and the number of channels you want to monitor determines which leadset is best suited for you. (Table 1-1 shows which leadsets can be used with each acquisition mode and the maximum data sampling speed of each combination.)

Data from the SUT is acquired in acquisition memory. You can then view the data samples in a variety of displays including the State Table and Timing Diagram Display formats. You can also store the data to a reference memory to recall and analyze.

To use the HSM, you must make the following connections:

1. Connect one or two P6487 High-Speed Probes to the PRISM mainframe.
2. Connect a leadset to each P6487 probe. (There are three types of leadsets available.)
3. Connect the leadset(s) to the SUT.

A description of the P6487 probe and each leadset, and instructions on how to connect them are on the following pages.

GETTING STARTED USING THE HSM

This section tells you how to quickly connect the HSM to your SUT and acquire data. This procedure uses one HSM, one P6487 High-Speed Probe, one Standard leadset, and your SUT. For details regarding each specific leadset, refer to the *Leadsets* and *Making HSM-to-SUT Connections* descriptions later in this section. Use Figure 2-1 and the following procedure to connect the HSM to the SUT.

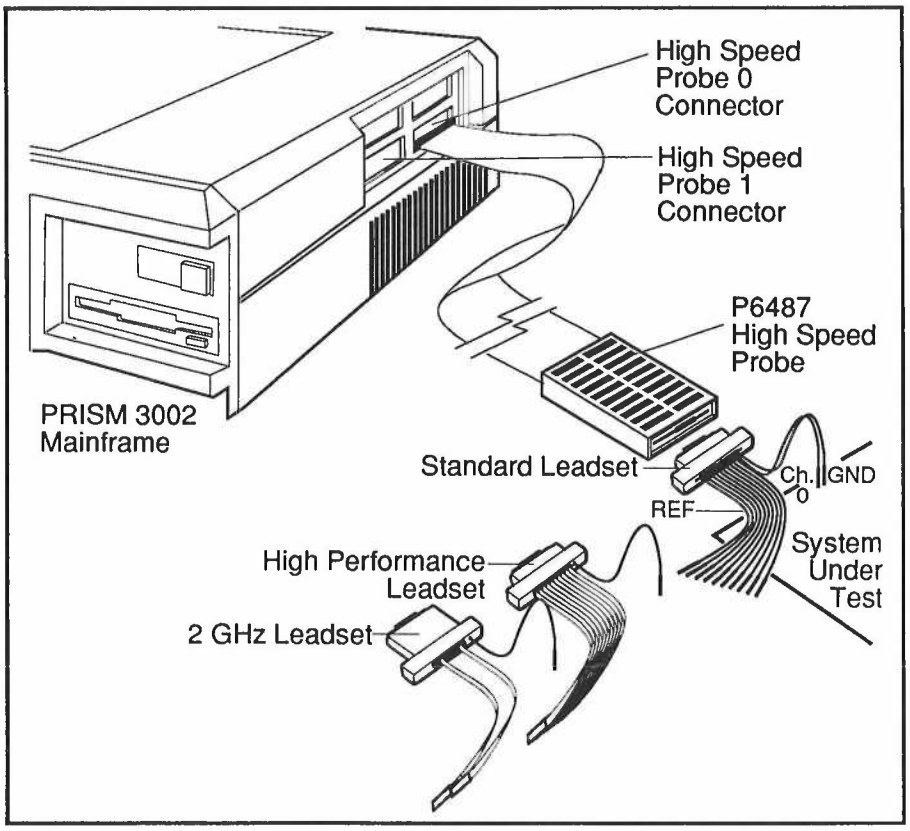


Figure 2-1. HSM-to-SUT connections.

1. Attach the 10 color-coded channel leads to the SUT (see Table 2-1). Refer to Figure 2-3 to see how to use grabber tips with the leads to make connections to the SUT easier.
2. Attach the ground (GND) and reference (REF) leads to the SUT.
3. Connect the leadset to the P6487 probe by aligning the channel numbers and inserting the leadset connector.

4. With the PRISM mainframe's power on Standby, insert the P6487 High-Speed Probe cable connector into the Probe 0 connector on the mainframe. This connector is keyed so that only the P6487 cable connector will fit in it; the P6487 cable connector only fits with the keying tabs oriented toward the top of the connector.

After completing the connections, you can make selections in the Hardware Analysis setup menu and acquire data. Follow these steps to modify the default Hardware Analysis Setup and acquire SUT data.

1. Power on the mainframe.

   The HSM software will automatically load if you have previously installed it in a PRISM system. Or, insert the appropriate disk when prompted to load the software.

2. In the Hardware Analysis setup menu, make or enter the threshold voltage selection appropriate for your SUT. For example, if you are acquiring data from TTL circuitry, then select TTL in the Threshold Voltage field.

3. Use the default trigger specification test (Events) and enter an event recognizer value. You can also use the default event recognizer value of all Xs.

   You can change the channel group radix by positioning the cursor on the group whose radix you want to change and pressing the function key labeled F5: Change Radix.

   The HSM has several event recognizer capabilities not found in most logic analyzers. Refer to *Defining the Event Recognizer* description later in this section.

4. Power on the SUT.

5. Press Start on the PRISM mainframe.

   After you press Start, the system displays information on the status of the trigger test. When the HSM finds the first instance where the event recognizer (channel group value) is as you defined it in the step 3, it marks that location as the trigger. Data is displayed in the State Diagram display format when the acquisition is 100% complete.

Figure 2-2 is an example of what the Timing Diagram display looks like when acquiring data from a counter.

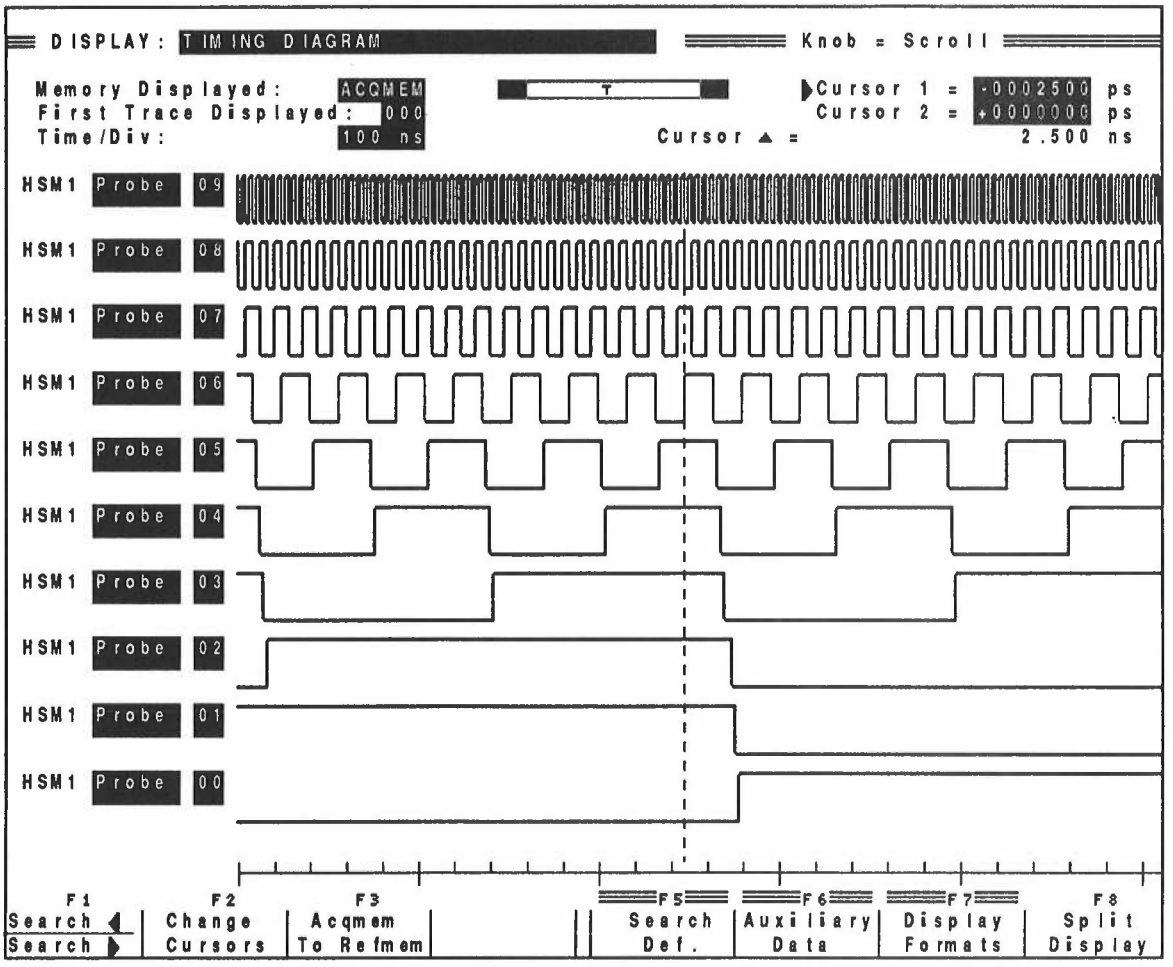


Figure 2-2. Example of acquired data in the Timing Diagram display format.

P6487 High-Speed Probe

The P6487 High-Speed Probe is used to acquire data samples using the HSM.

Probe. The hardware that connects the mainframe to a leadset. The probe is composed of a connector to the mainframe, a cable, a plastic housing containing a circuit board, and a connector to the leadset.

Leadset. The hardware that connects the probe to the SUT.

Podlet. Circuitry contained at the tips of the leads on the High Performance and 2 GHz leadsets.

The HSM can acquire data using one or two P6487 probes. Each probe is numbered according to the panel connector to which it connects. Probe 0 connects to the back connector and probe 1 connects to the front connector. Refer to Figure 2-1 to see how the probes and leadsets connect to the HSM.

CAUTION

Make sure the PRISM is powered down before changing P6487 probes. Connecting a probe to the PRISM mainframe with the PRISM power on can damage the HSM.

Press the button labeled ID on the probe for probe and leadset information.

To identify which HSM module the P6487 High-Speed Probe is connected to, press the button labeled "ID" on the P6487. The module to which the probe is connected will be identified on the top line of the screen. An example of such an ID number is `HSM1: Internal Probe 0 with Standard leadset` where `HSM1: Internal` stands for the Hardware Analysis Module installed in the first position of a PRISM 3000 mainframe and `Probe 0` stands for the P6487 probe attached to the HSM connector nearest the rear panel. `With Standard Leadset` means that the Standard leadset is connected to Probe 0.

Leadsets

The P6487 has three different types of leadsets that you can use: the Standard, the High Performance, and the 2 GHz leadset. The probe and leadset provide a way to connect the HSM to the SUT.

NOTE

You can change leadsets with the power on both the PRISM mainframe and the SUT. However, you should never change the P6487 probes without first powering down the PRISM .

Be sure to press the probe ID button on the P6487 after changing any leadset.

Be sure to press the probe ID button on the P6487 probe after changing any leadset. This ensures that you are connecting the leadset to the correct HSM and probe. It also ensures that you do not accidentally set up the channel groups and trigger specification for the wrong probe and leadset.

The Standard leadset has 10 signal leads, one ground lead, one reference lead, and is easiest to connect to a SUT.

The Standard Leadset. This leadset comes with your P6487 and is suitable for most timing situations (leadset risetime is 2.5 ns). The Standard leadset has 10 signal leads (color coded by channel number, see Table 2-1) one ground (GND) lead, and one reference (REF) lead.

Ground. A 0 V condition, usually the earth ground common between the PRISM module and your SUT, from which system voltages are measured.

Reference. A voltage from which system voltages are measured. The difference between reference and ground is that you can connect the reference channel to a voltage other than ground (0V), and the logic analyzer will set logic thresholds relative to that reference voltage.

The High Performance leadset has 10 signal leads, each with its own reference lead, and one ground lead. The low timing skew and enhanced voltage sensitivity makes it a good choice for ECL.

The High Performance Leadset. This leadset is suitable for use in faster timing situations (leadset risetime is 1.0 ns) and is more sensitive than the Standard leadset. It is recommended for critical timing measurements, especially in ECL systems.

There are 10 signal pairs on the High Performance leadset, each containing a signal channel and reference channel. Many reference channels help control crosstalk between the input channels through the reference channels. The reference channels are all common. There is also one ground lead.

NOTE

The High Performance leadset is recommended for monitoring high-speed signals, especially ECL systems.

The 2 GHz Leadset. This leadset is suitable for use in ultra high-speed timing situations (leadset risetime is 600 ps) requiring sub-nanosecond resolution. The 2 GHz leadset has two signal leads each with its own independent reference, allowing differential measurements. (Refer to Table 2-4.) There is also one ground lead.

NOTE

The 2 GHz leadset is recommended for monitoring critical signals with sub-nanosecond resolution.

MAKING HSM-TO-SUT CONNECTIONS

Refer to Figure 2-1 and the following procedure while making leadset and probe connections.

1. Attach the channel leads to the SUT.

   Figure 2-3 shows how to use grabber tips with the leads to make connections to the SUT easier. Standard grabber tips can be used with the Standard leadset. If needed, you can use a reference/signal leadset to allow use of standard grabber tips with the High Performance or 2 GHz leadsets. Refer to Appendix C for part numbers of optional accessories.

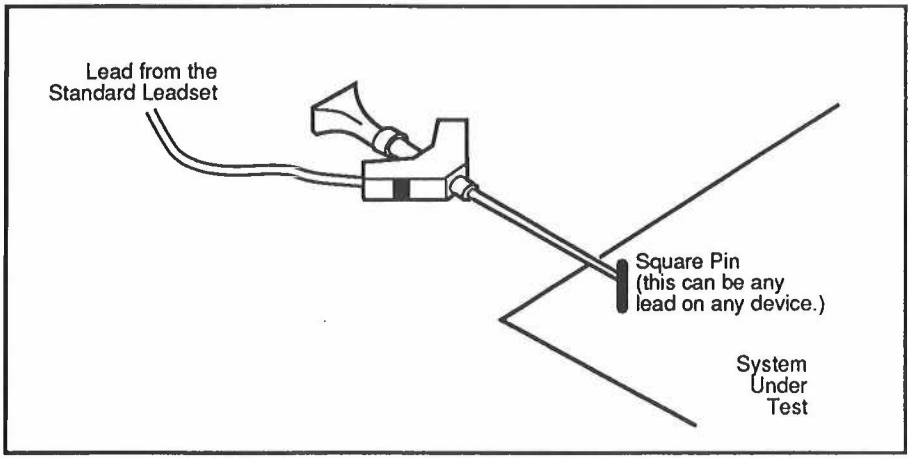


Figure 2-3. Using a standard grabber tip to attach a lead.

The Standard leadset has 12 leads. The ground and reference leads are clear. The other 10 leads are color coded using resistor-color-code values to indicate channel number-to-color assignment as shown in Table 2-1.

Table 2-1
STANDARD LEADSET COLOR AND CHANNEL NUMBER

Color	Channel Number
Clear	GND
Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Gray	8
White	9
Clear	REF

The High Performance leadset has a single ground wire and 10 podlets, each with a channel contact and a reference contact. The podlets are identified on the leadset label according to channel number.

The 2 GHz leadset has a single ground wire and two podlets, each with a channel contact and an independent reference contact. The podlets are identified on the leadset label according to channel number.

2. Attach the reference lead to the SUT. Normally, you should connect the reference leads to ground. You can also connect the reference leads to a different voltage if need be. For example, if you want to acquire ECL data running off of a +5 V supply, you would connect the reference to +5 V.

   Refer to step 1 and Figure 2-3 to see how to use grabber tips with the leads to make connections easier.

   The clear lead nearest channel 9 is the reference on the Standard leadset. The channels and references on the High Performance and 2 GHz podlets are marked as such.

3. Attach the ground lead to the SUT.

   The clear lead nearest channel 0 is the ground on the Standard leadset. The ground lead on both the High Performance and 2 GHz leadsets are also marked.

4. Connect the leadset to the P6487 probe. Orient the channel numbers on the leadset to match those on the probe.
5. The PRISM must be powered down before connecting the P6487 to it. Insert the P6487 High-Speed Probe cable connector into one of the two high-speed panel connectors on the mainframe. This panel connector is keyed so that only the P6487 cable connector will fit in it; the P6487 cable connector only fits with the keying tabs oriented toward the top of the connector.

ACQUIRING HIGH-SPEED DATA

The Hardware Analysis setup menu allows you to specify SUT data to acquire and store. You can set up the acquisition to provide you with the exact SUT information you need by selecting from the following features in the Hardware Analysis setup menu:

- acquisition mode
- when to stop acquiring
- memory depth
- number of triggers (number of partitions)
- trigger position in memory
- acquisition threshold voltage
- channel groups (through the Channel Grouping submenu)
- an event
- an action to perform as a result of satisfying the event
- communication links with other modules

To access the Hardware Analysis setup menu, press the Setup key and scroll through the setup menu choices until you reach the Hardware Analysis selection. (You will have more than one Hardware Analysis setup menu if you have more than one HSM installed in your PRISM mainframe or in an expansion system.) Refer to the *P6487 High-Speed Probe* discussion earlier in this section and to your system user's manual for a description of how the various modules are identified.

A default setup allows you to acquire data without modifying the Hardware Analysis setup menu. The following discussion describes this menu's features, functions, and selections.

Figure 2-4 shows the Hardware Analysis setup menu, briefly describes each field, and lists the available selections. The remainder of this section discusses the selections in more detail.

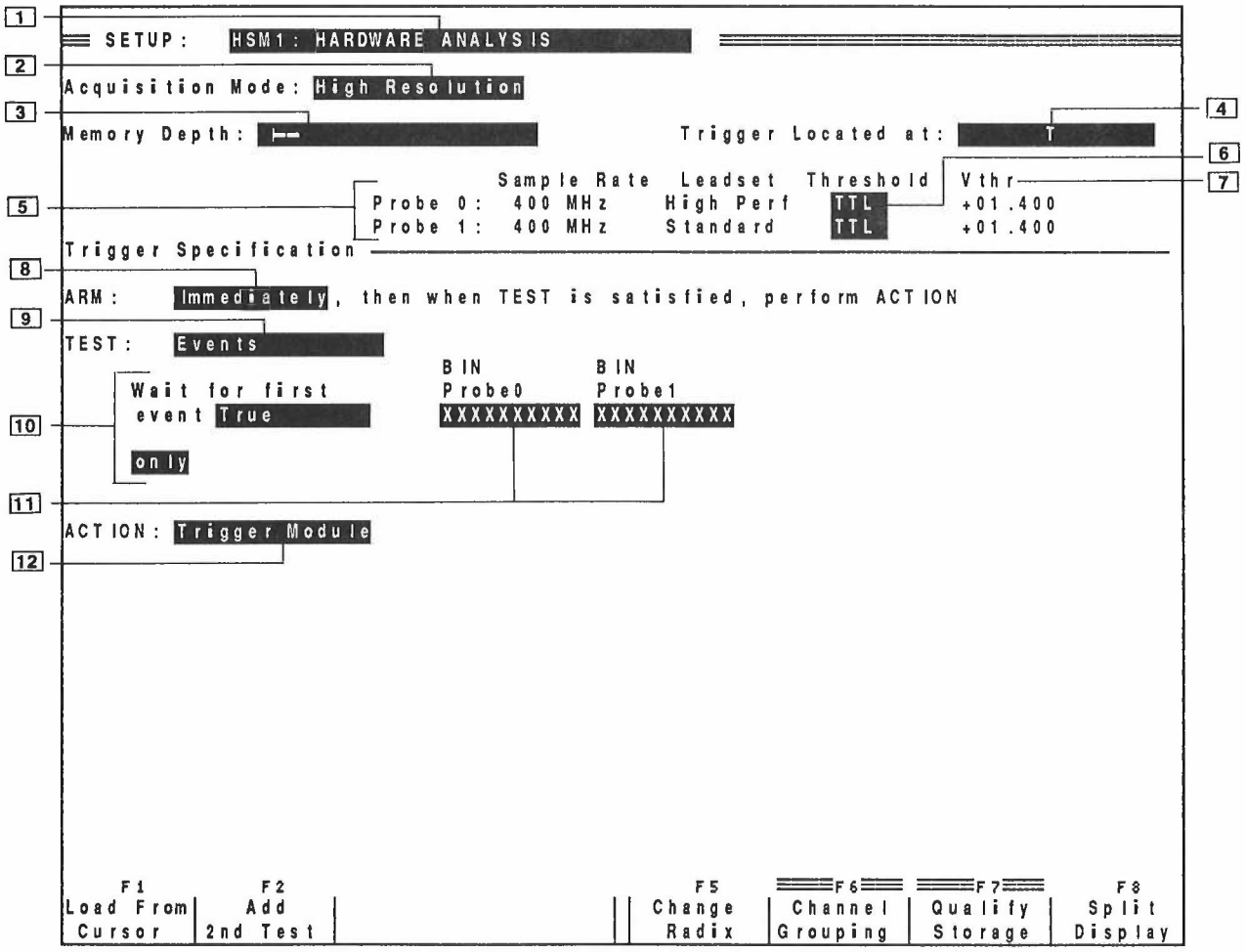


Figure 2-4. Hardware Analysis setup menu.

1 **Menu Select.** Lets you select a menu from the setup menu group.

2 **Acquisition Mode.** Lets you select the overall mode of operation for the module. This determines the method of data sampling. Selections are High Resolution and Dual Threshold. The leadset combined with the acquisition mode determines the data sampling rate. You may also turn the HSM off in this field.

3 **Memory Depth.** Lets you select the amount of acquisition memory in which to acquire data. The minimum memory depth is 192; the maximum memory depth is 12,288.

4 **Trigger Position.** Determines the minimum amount of data stored after the trigger. Five trigger positions are offered.

5 **Sample Rate, Probe, and Leadset Information.** These information fields show which leadset is connected to each probe and the maximum data sampling rate. The maximum data sampling rate varies depending on the combination of leadset and selected operating mode.

6 **Threshold.** Lets you specify the logic threshold voltage. Selections are TTL, ECL ,CMOS, and VAR (variable). Variable threshold allows you to enter a value from +10 V to -10 V in increments of 50 mV for the Standard leadset and a value from +5 V to -5 V in increments of 25 mV for the High Performance and 2 GHz leadsets. When operating in the Dual-Threshold mode, both high and low voltage threshold values are provided.

7 **Threshold Voltage.** This field is normally an information field that shows the voltage setting for the selected threshold. When operating with a 2 GHz leadset, a second column labeled Vref follows the Vthr column. This lets you enter a value for Vthr and Vref from -5 V to +5 V in increments of 25 mV. The default value for Vthr is +1.4 V; the default value for Vref is 0 V.

8 **Arm.** Lets you specify whether to start searching for the event immediately or to wait until after a TekLink signal (1 or 2) is received from another module.

9 **Trigger Test Type.** Lets you define the SUT activity that you want to acquire and examine. Selections are Events, Extend Events, Duration, Period, Delay, Accumulate Time, Count, Time While, Setup Time, and Hold Time.

10 **Trigger Test.** This description and selections vary between tests. Refer to the individual test descriptions later in this section for information regarding the available trigger tests. When the data sample that satisfies the test is found, that data sample is marked in memory as the trigger (if triggering is the selected PRISM action).

11 **Event Recognizer.** Lets you enter a channel group value (an event) for the HSM to monitor.

12 **Action.** Lets you specify an action for the PRISM to perform when the test is satisfied. Selections are Trigger Module, Trigger System, Reset Module, Trigger Module and Set Signal (1 or 2), Set Signal (1 or 2), and Do Nothing.

Function Keys

F1: Load From Cursor. Loads the channel group value from the active data cursor in the Display menu. The field cursor must be positioned on a channel group value.

F2: Add 2nd Test/Delete 2nd Test. Adds a second trigger test below the first test. When a second test is already added, F2 can be used to delete it.

F5: Change Radix. Changes the input radix for the channel group on which the field cursor is positioned. Available radixes are binary, octal, hexadecimal, and symbol.

F6: Channel Grouping. Accesses the Channel Grouping submenu.

F7: Qualify Storage. Accesses the Qualify Storage submenu.

F8: Split Screen. Splits the screen into top and bottom panes. When you use the split screen display, this function key toggles between Switch/Unsplit.

Selecting the Acquisition Mode

The acquisition mode sets the overall operation of the module. You can select one of three types of acquisition modes in which to sample data: High Resolution or Dual Threshold. You can also choose to not acquire data by selecting Off.

High Resolution acquisition. An acquisition in which data sampling occurs every 2.5 ns (400 MHz). (Data storage occurs each time any channel changes logic levels. Transitional memory storage is explained later in this manual.) The sampling speed can be increased to 500 ps (2 GHz) when using the 2 GHz leadset.

Dual-Threshold acquisition. An acquisition in which the data sample is compared to separate high and low threshold voltages to determine the logic level. Data sampling occurs every 5 ns (200 MHz). (Data storage occurs each time any channel changes logic levels. Transitional memory storage is explained later in this manual.) Only the Standard and High Performance leadsets can be used in this mode.

High Resolution Mode

Use High Resolution acquisition mode when you want high timing resolution.

The High Resolution acquisition mode gives you the most accurate picture of activity on the SUT. Data is acquired with a resolution of 2.5 ns (400 MHz).

Data is stored whenever there is a change on any single channel within a channel group. Transitional memory storage is used to extend memory. Refer to the *Transitional Memory Storage* description for an explanation of the benefits of transitional memory storage, later in this manual.

Dual-Threshold Acquisition Mode

Use Dual-Threshold mode when you suspect noise or a glitch, or when you want to control the resolution of both voltage and time.

In Dual-Threshold mode the HSM samples data based on two separate thresholds for logic high and logic low. You can specify high and low threshold voltage values for each probe. The data is acquired with a 5 ns resolution (200 MHz).

Data is stored whenever there is a change on any single channel within a channel group. Transitional memory storage is used to extend memory here in the same way it is used in the High Resolution acquisition mode. Refer to the *Transitional Memory Storage* description for an explanation of the benefits of transitional memory storage, later in this manual.

HSM Off

Selecting Off stops the HSM from acquiring data and participating in the system trigger. Selections concerning the HSM are removed from other menus such as the Execution Control, State Table Display, Timing Diagram Display, and submenus of these menus.

Transitional Memory Storage

Transitional memory storage can extend the effective memory depth of the HSM by only storing samples when there is a change in data. A transition in data occurs when at least one channel value changes from a logic high (1) to a logic low (0) or from a logic low to a logic high. When data is displayed, the timestamp is used to accurately reconstruct the data samples as they occurred in real time.

If the data is changing frequently, a data sample is stored for each clock cycle causing transitional memory storage to act like traditional asynchronous storage. In such cases, transitional memory storage will not extend memory. Memory fills rapidly even if only one channel is changing frequently.

Figure 2-5 shows the difference in the number of samples stored between an acquisition using transitional memory storage and traditional asynchronous storage.

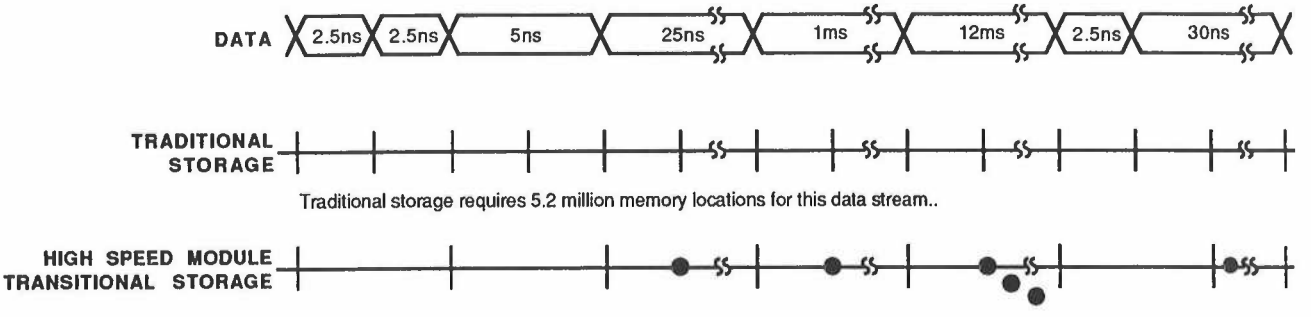


Figure 2-5. Transitional memory storage versus traditional asynchronous storage. The resolution of the data shown here is 2.5 ns. When data rates are 5 ns and faster, there is no difference between the two modes of storage. When the data rates are slower or come in bursts, transitional storage is more efficient.

Transitional memory storage is valuable when you need to monitor low-rate or high-resolution data. This is useful when testing disk drives, telecommunications devices, serial data or asynchronous buses, and electromechanical and process control applications where events happen slowly or infrequently.

Selecting the Memory Depth

You can define the memory depth of the HSM to be from 192 memory locations to 12,288 (each location contains a 41-bit word). As you cycle through the memory choices, the memory depth bar changes size. Figure 2-6 shows the memory depth bar and the amount of data each selection represents.

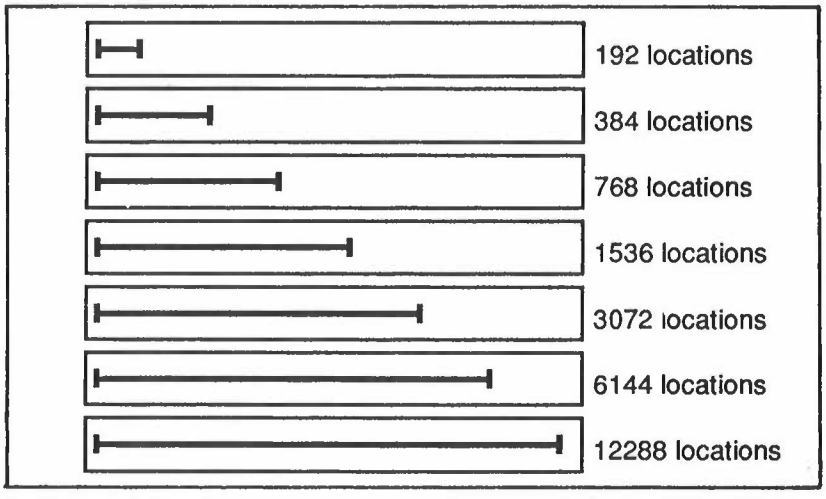


Figure 2-6. Memory Depth selections.

Smaller memories respond faster and let you store more data acquisitions on disk (as reference memories). Larger memories can store more data around the trigger, thus giving more information about the SUT.

Selecting the Trigger Position

The selected trigger position controls the minimum amount of acquisition memory. Use the trigger position field to make the postfill selection.

Prefill. The amount of memory in which data is acquired and stored before the HSM locates the trigger event. If there are too few data samples to fill this memory prior to the HSM finding the trigger event, then the unfilled portion of this memory is also filled with postfill data.

Postfill. The amount of memory in which data is acquired and stored after the HSM locates the trigger event. Postfill memory will fill any unused prefill memory locations with postfill data when the trigger event is found before memory has completed prefill.

The amount of prefill memory that is filled with data varies depending on how soon the trigger occurs after starting the acquisition. If the trigger event occurs immediately after the start of an acquisition, there may be no data before the trigger, regardless of the selected trigger position. However, the prefill memory is not wasted. Any unused part of the prefill memory is added to the postfill so all of your acquisitions make full use of the memory you have selected.

Choose the trigger location by placing the cursor on the Trigger Position field and cycling through the five trigger positions.

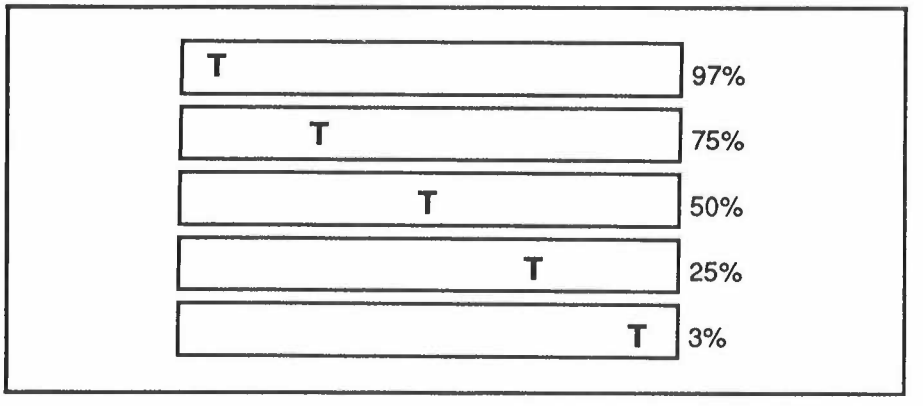


Figure 2-7. Trigger positions.

Figure 2-7 shows the visual representation on the screen and the amount of postfill (as a percentage of memory) represented by each trigger location choice. The rectangle represents the total memory as defined in the memory depth field. The T represents the location of the trigger in relation to the total memory. The maximum acquisition memory available for the HSM is 12,288 memory locations.

NOTE

If the trigger condition is met on the first sample acquired, the trigger will be displayed at the first location, regardless of which trigger location was selected (there is no prefill data).

Selecting the Acquisition Threshold Voltage

The acquisition threshold voltage is the voltage to which the input signals are compared. Signals below this voltage are logic low (0); signals above this voltage are logic high (1).

In Dual-Threshold mode, separate voltages are specified for logic low and logic high. Signals between these voltages are labeled as a middle voltage with an M. For more details about the M, refer to *Defining the Event Recognizer* later in this section.

You can select the logic threshold voltage as either TTL, ECL, CMOS, or VAR. Table 2-2 shows the acquisition threshold choices for TTL, ECL, and CMOS selections when used in the High Resolution mode (single threshold) or in the Dual-Threshold mode.

Table 2-2
ACQUISITION THRESHOLD VOLTAGES

Selection	Single Threshold	Dual Threshold	
		Low	High
TTL	+1.4 V	+1.00 V	+2.00 V
ECL*	-1.3 V	-1.65 V	-1.00 V
CMOS**	+2.5 V	+1.50 V	+3.50 V

*Assumes - 5.2 V ECL.
**Assumes +5 V CMOS

The variable (VAR) threshold selection allows you to enter a Vlow and Vhigh threshold voltage values for each leadset. Vlow must be the lower voltage and Vhigh must be the higher voltage. Table 2-3 shows the available voltage threshold ranges and step size by leadset when you select VAR.

Table 2-3
VARIABLE THRESHOLD RANGE AND STEP SIZE BY LEADSET

Leadset	Voltage Range	Step Size
Standard	+10 V to -10 V	50 mV
High Performance	+5 V to -5 V	25 mV
2 GHz	+5 V to -5 V	25 mV

The 2 GHz leadset has full differential inputs. When using the 2 GHz leadset, the Vthr field (normally used for information only) becomes the Vthr and Vref fields. Table 2-4 shows the default threshold voltages for these fields.

Table 2-4
2 GHz LEADSET THRESHOLD VOLTAGES

Threshold	Vthr	Vref
TTL	+1.4 V	0.0 V
ECL	-1.3 V	0.0 V
CMOS	+2.5 V	0.0 V
VAR	selectable	selectable

When using the 2 GHz leadset and setting these threshold voltages, keep the following in mind:

- If you are using ground (0 V) as a reference, do not change the Vref voltage.
- If you are using +5 V as a reference, set the Vref to +5.0 V.
- If you are probing a differential input, set both the Vthr and Vref fields to the same voltage value.

Creating a Trigger Specification

Trigger tests make it easy for you to make accurate timing measurements as well as trigger the PRISM on timing conditions. The trigger tells the HSM to stop acquiring data and display that data in the State Table or Timing Diagram format.

Arm. A condition that must be satisfied (usually a signal from another module) before the HSM will begin to perform the trigger test. Data is acquired but is not compared to the event until arming is satisfied.

Test. A condition that must be met before the HSM will perform the selected action.

Action. Instructions that the PRISM will carry out when the test is satisfied.

The following list shows the types of selections you might make when setting up your trigger test. The rest of this section describes these selections in detail.

- selecting the trigger test to perform the measurement
- grouping channels together and giving them a meaningful name
- selecting when to start the trigger search (arming)
- entering channel group values (event recognizers) to measure
- selecting an action for the PRISM to perform (trigger module, trigger system, reset module, etc.) when the test is satisfied

Specifying a Trigger Test

The trigger test is a condition that must be met before the HSM will perform the selected action. Trigger tests fall into one of the three following categories:

- Tests that recognize one or two events. The available tests are Events or Extend Events.
- Tests that use a timer to measure the length of an event. The available tests are Duration, Period, Delay, Accumulate Time, Time While, Setup Time, and Hold Time.
- Tests that use a counter to count the occurrences of an event. The Count test is the only test using a counter.

Use the Test field to specify the type of test for the HSM to perform.

Event Recognition. Use either the Events or Extend Events test to locate one or two events on the SUT.

Events -- This test can look for one or two events (words). Figure 2-8 shows the SUT condition that the HSM looks for during this test. Figure 2-9 shows the fields found in the Events test.

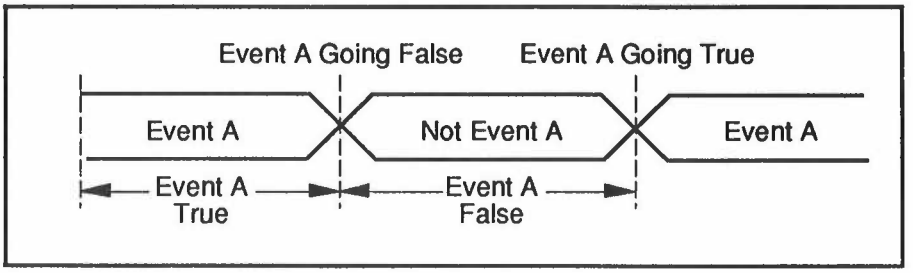


Figure 2-8. SUT condition that the Events test looks for.

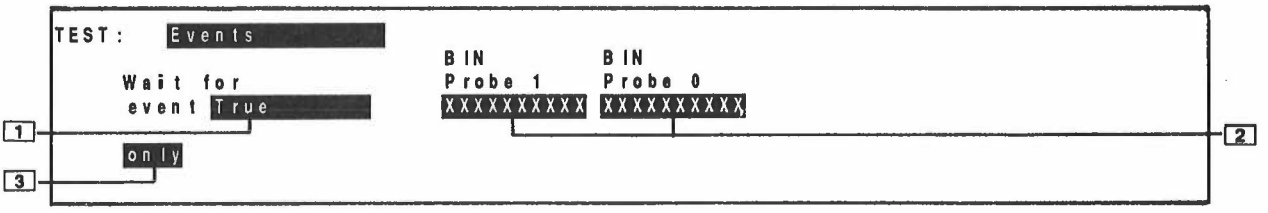


Figure 2-9. Events test fields.

1 **Event True/False.** Lets you choose to look for the event recognizer value to be exactly as entered (True), or not that value (False). Selecting Going True requires the event recognizer to go from false to true. Selecting Going False requires the event recognizer to go from true to false.

2 **Event Recognizer.** Lets you enter the value (event A in Figure 2-8) for which you are looking.

3 **Connector.** Lets you select to look for a second event after the first event is found (Then), either the first or second event (Or), a second event at the same time as the first event is found (And), or only one event (Only).

Extend Events -- This test can look for a 21-bit or wider event (word). This word may extend across all HSMs in the mainframe and expansion mainframes, using TekLink signals. Figure 2-10 shows the SUT condition that the HSM looks for during this test. When you choose to trigger on an extended event, you must select a signal and enter a value for the channel groups.

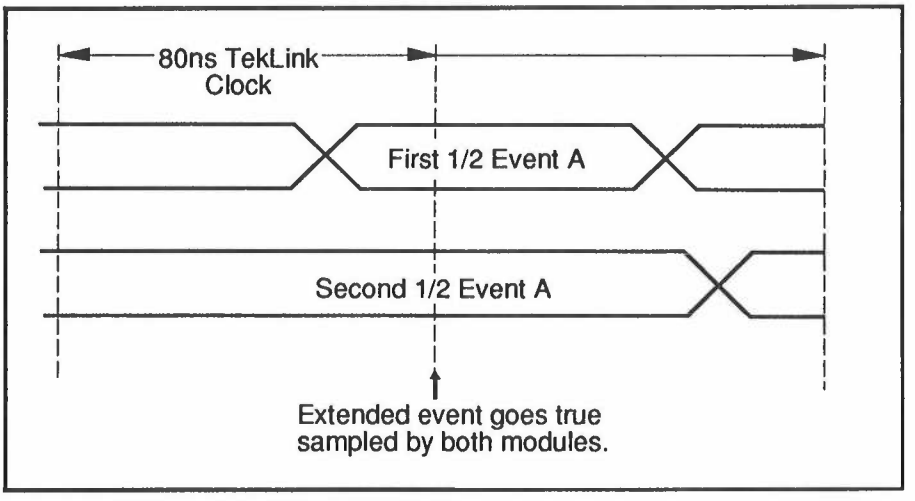


Figure 2-10. SUT condition that the Extend Events test looks for.

TekLink signals are clocked every 80 ns. The first test uses TekLink signals 1 or 3 to extend the top event recognizer and TekLink signals 2 or 4 to extend the bottom event recognizer. If you add a second Extend Events test, the second test uses Signal 3 to extend the top event recognizer and Signal 4 to extend the bottom.

If you are extending the event recognizer across two or more HSMs, then you must enter the Hardware Analysis setup menu for each HSM and select this test. You must enter the event recognizer value for the channels within each trigger specification.

The event isn't satisfied until the extended event recognizer value is found. Figure 2-11 shows the fields found in the Extend Events test.

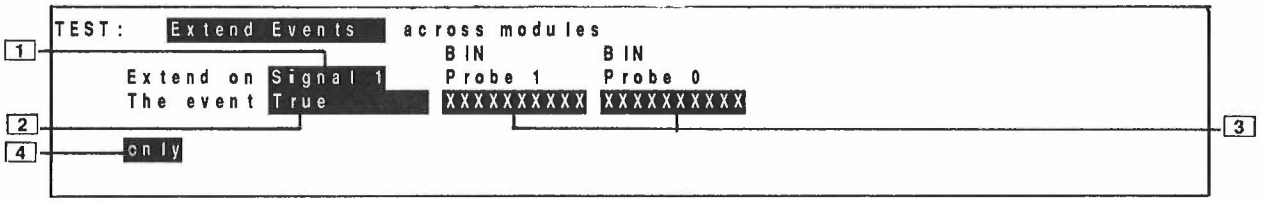


Figure 2-11. Extend Events test fields.

[1] **Extend On Signal.** Lets you choose to extend the event (word) over the selected TekLink signal.

[2] **Event True/False.** Lets you choose to look for the event recognizer value to be exactly as entered (True), or not that value (False). Selecting Going True requires the event recognizer to go from false to true. Selecting Going False requires the event recognizer to go from true to false.

[3] **Event Recognizer.** Lets you enter the channel group value (event A in Figure 2-10) for which you are looking.

[4] **Connector.** Lets you select to look for a second event sequentially after the first event is found (Then), either event (Or), a second event at the same time as the first event (And), or only one event (Only).

Timer Measurements. You can use tests using a timer to take a variety of measurements. Tests using a timer are the Duration, Period, Delay, Accumulate Time, Time While, Setup Time, and Hold Time tests. Tests using the timer can make measurements to over 65 days (over 5.625 million seconds).

In these tests, the trigger occurs as soon as the specified time value is attained. For example, if you were looking for an event to be present for 50 ns, the module would trigger when that event had been valid for 50 ns and continue to measure the total length of the event. The time of the completed measurement is shown in the Auxiliary Data submenu of the State Table or Timing Diagram Display menus. Figure 2-12 shows when the trigger would occur in this example and that the event was valid for 80 ns.

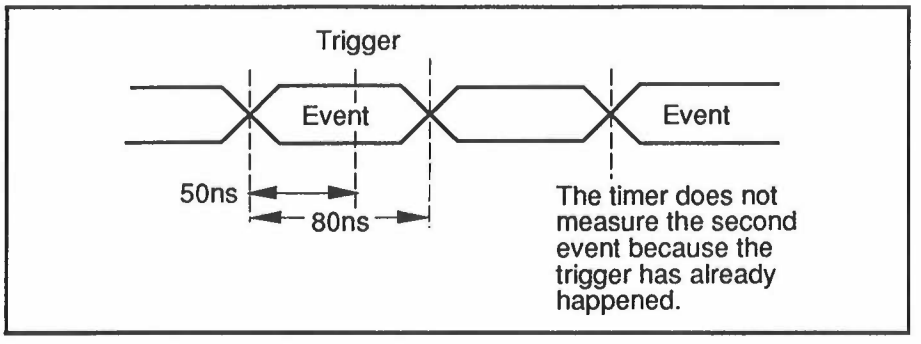


Figure 2-12. Triggering on an event using the timer. After marking the trigger, the HSM continues the measurement until the event changes value. You can view this absolute time value in the Auxiliary Data submenu of the State Table or Timing Diagram display menus.

Duration. -- This test measures the amount of time that the event is valid. Figure 2-13 shows the SUT condition that the HSM looks for during this test. Enter the time duration and event value for which you are looking. You can choose to look for the duration of the event to be less than (<), or greater than or equal to (≥) a specified time interval. Figure 2-14 shows the fields found in the Duration test.

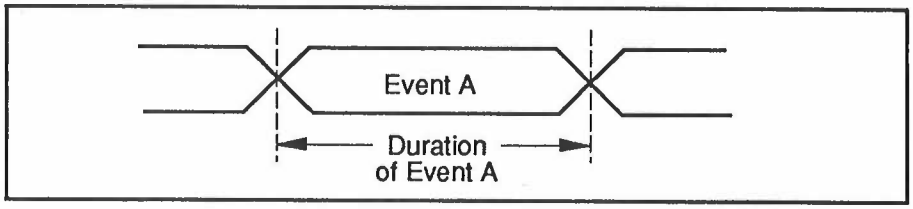


Figure 2-13. SUT condition that the Duration test looks for.

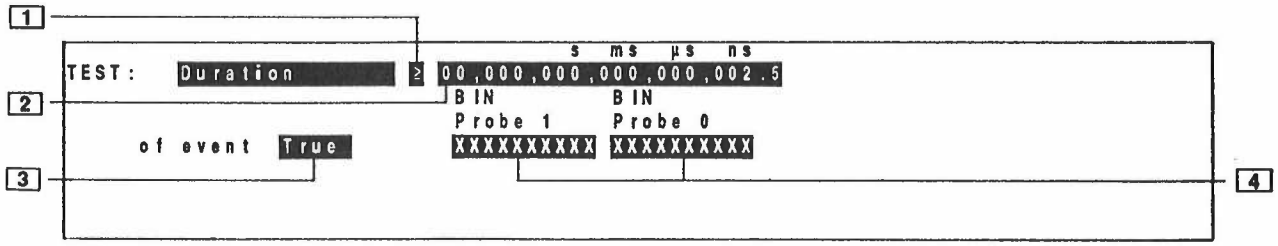


Figure 2-14. Duration test fields.

1 **Qualifier.** Lets you look for the event duration to be less than (<), or greater than or equal to (≥) a specified length of time.

2 **Duration Time.** Lets you enter the length of time to which you want to compare the event duration.

3 **Event True/False.** Lets you choose to select whether to start the measurement on the leading (True) edge or trailing (False) edge of the event.

4 **Event Recognizer.** Lets you enter the channel group value (event A in Figure 2-13) for which you are looking.

Period -- This test looks for a specific amount of time to elapse between two rising or two falling edges of a single event. Another way to think about it is that this test measures the period of time from the start of an event word to the start of the next occurrence of that same event word, or from the end of an event word to the end of the next occurrence of that same event word.

You can choose to look for the period to be less than (<), or greater than or equal to (≥) a specified time interval. Figure 2-15 shows the SUT condition that the HSM looks for during this test. Figure 2-16 shows the fields found in the Period test.

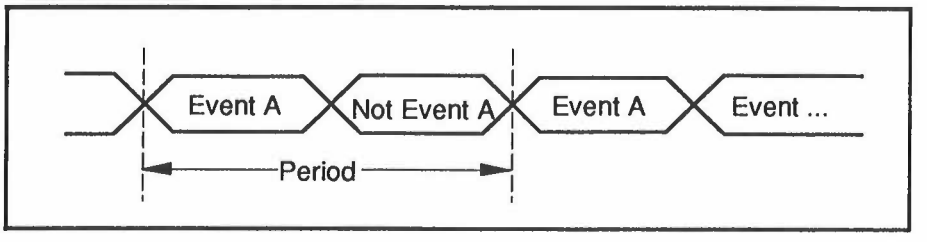


Figure 2-15. SUT condition that the Period test looks for.

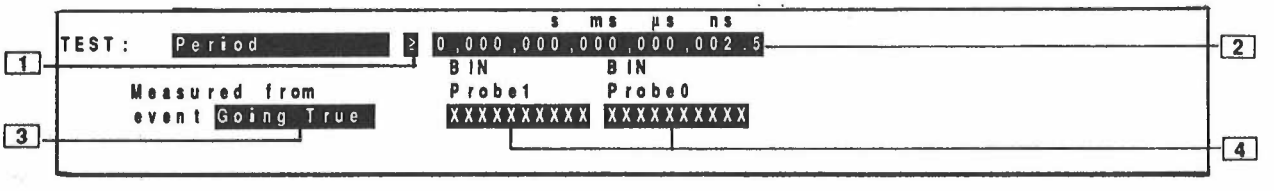


Figure 2-16. Period test fields.

[1] **Qualifier.** Lets you look for an event period as less than (<), or greater than or equal to (≥) a specified length of time.

[2] **Period Length.** Lets you enter the length of time to which you want to compare the event period.

[3] **Event Going True/False.** Lets you choose to start measuring the period from when the event starts (Going True) or from when the event ends (Going False).

[4] **Event Recognizer.** Lets you enter the channel group value (the period in Figure 2-15) for which you are looking.

Delay -- This test looks for a specific amount of time to elapse between two events. Figure 2-17 shows the SUT condition that the HSM looks for during this test. Enter the time delay and event recognizer values for which you are looking. You can choose to look for a delay to be less than (<), or greater than or equal to (≥) a specified time interval. Figure 2-18 shows the fields found in the Delay test.

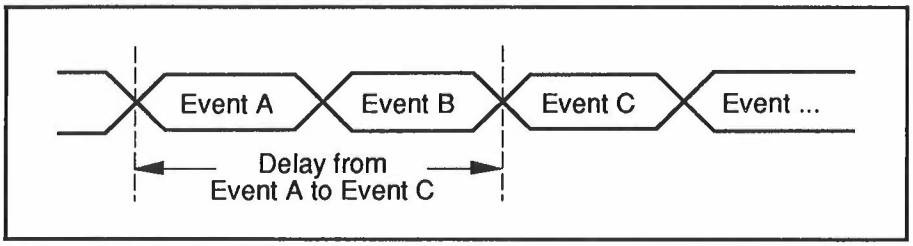


Figure 2-17. SUT condition that the Delay test looks for.

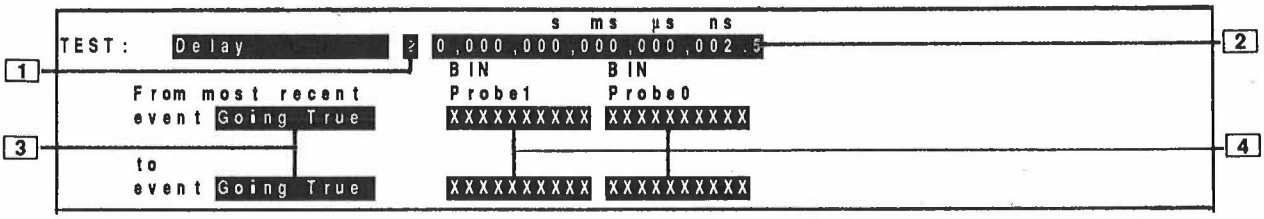


Figure 2-18. Delay test fields.

1 **Qualifier.** Lets you look for the delay between two events to be less than (<), or greater than or equal to (≥) a specified length of time.

2 **Time Delay.** Lets you enter the length of time to which you want to compare the delay between the two events.

3 **Event Going True/False.** Lets you choose between measuring the delay from the start (Going True) or the end (Going False) of the events.

4 **Event Recognizer.** Lets you enter the channel group values (events A and C in Figure 2-17) for which you are looking.

Accumulate Time -- This test measures the total amount of time, over all intervals, between a pair of events. The Accumulate Time test measures and adds together the reoccurring delays between two events. Figure 2-19 shows the SUT condition that the HSM looks for during this test. Figure 2-20 shows the fields found in the Accumulate Time test.

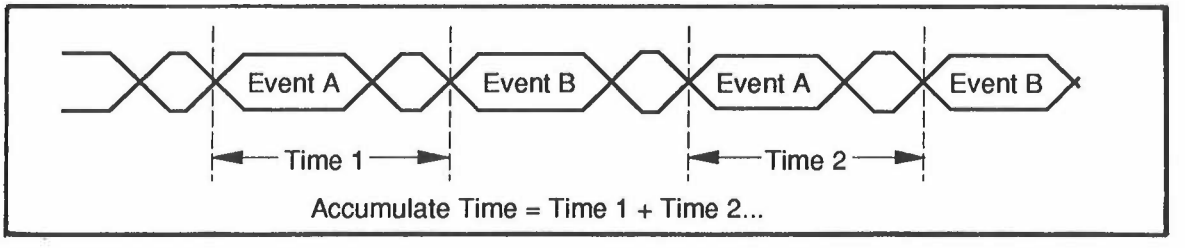


Figure 2-19. SUT condition that the Accumulate Time test looks for.

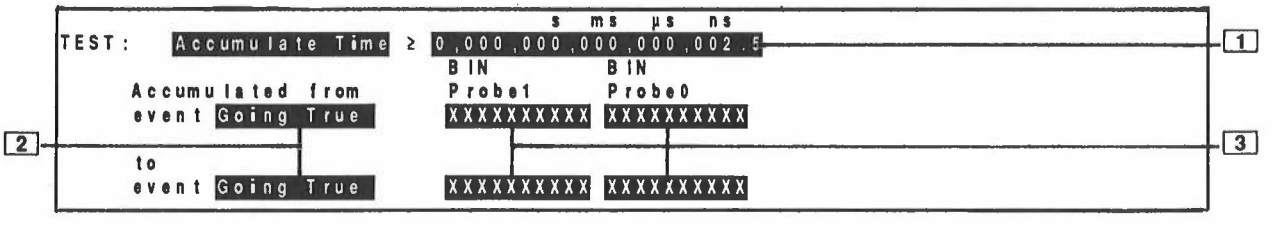


Figure 2-20. Accumulate Time test fields.

[1] **Accumulated Time.** Lets you enter the length of time to which you want to compare the total accumulated time.

[2] **Event Going True/False.** You can measure from the beginning of the event (Going True) or from the end of the event (Going False).

[3] **Event Recognizer.** Lets you enter the channel group values (events A and B in Figure 2-19) on which to start and stop the timer.

Time While -- This test measures how long a single event value is valid over an entire partition (the part of acquisition memory around a trigger). This test adds together all the time intervals of every occurrence of a single event. A second event resets the timer. Refer to *Counter Measurements* (later in this section) for a description of how resetting the timer works.

Figure 2-21 shows the SUT condition that the HSM looks for when performing this test. Enter the time and event value for which you are looking. You can choose to look for the accumulated time to be less than (<), or greater than or equal to (≥) a specified time interval. Figure 2-22 shows the fields found in the Time While test.

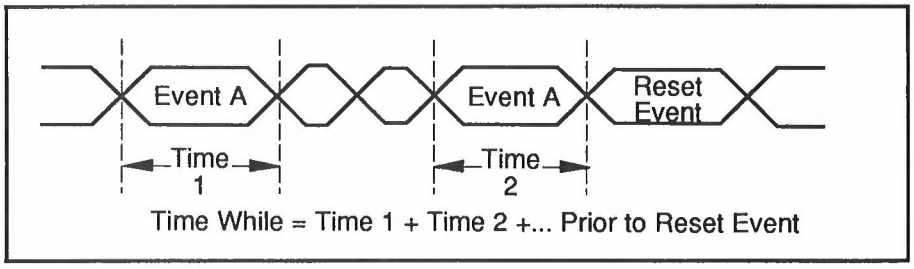


Figure 2-21. SUT condition that the Time While test looks for.

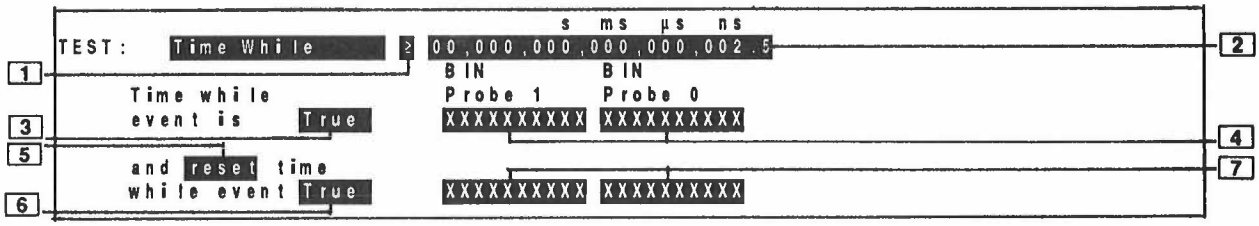


Figure 2-22. Time While test fields.

1 **Qualifier.** Lets you look for the total time a single event is valid during an entire acquisition to be less than (<), or greater than or equal to (≥) a specified length of time.

2 **Time While Time.** Lets you enter the desired interval of time.

3 **Event True/False.** Lets you choose to look for the test to be satisfied when the event occurs (True), or when the event does not occur (False).

4 **Event Recognizer.** Lets you enter the channel group value (event A in Figure 2-21) for which you are looking.

5 **Reset Time.** Lets you choose to reset the timer or not.

[6] **Reset Event True/False.** Lets you choose to reset the timer either when the reset event occurs (True) or when the reset event does not occur (False).

[7] **Reset Event Recognizer.** Lets you enter the channel value (reset event in Figure 2-21) on which to reset the timer.

Setup Time -- This test looks for the data to be stable for a specified length of time before the clock pulse occurs. Marking data channels with a U causes the event recognizer to look for unstable data (rising edge, falling edge, or between thresholds in Dual-Threshold mode) on any of the selected channels. Figure 2-23 shows the SUT condition that the HSM looks for during this test. Figure 2-24 shows the fields found in the Setup Time test.

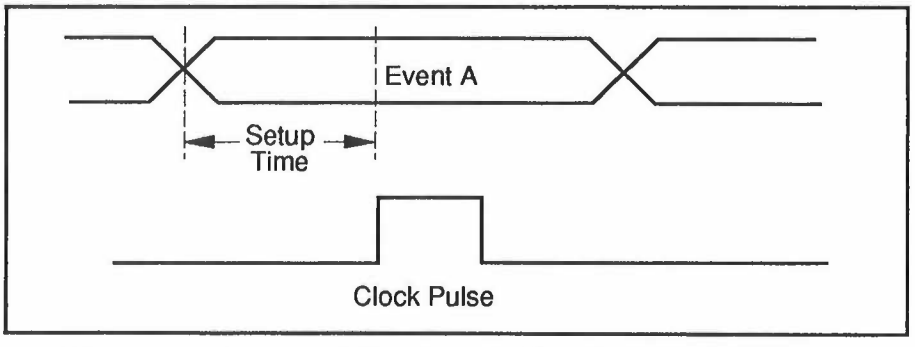


Figure 2-23. SUT condition that the Setup Time test looks for.

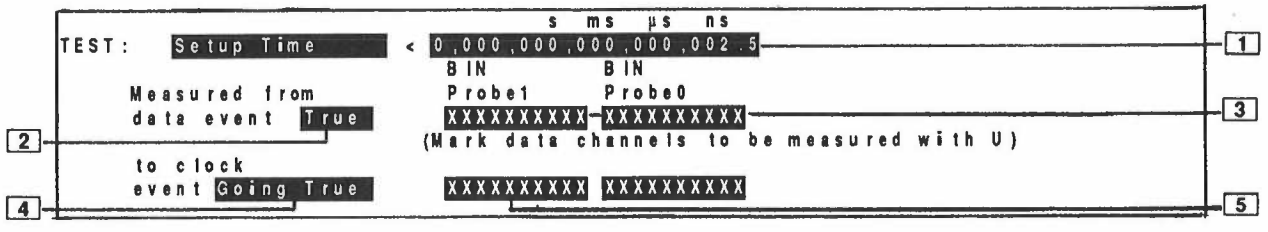


Figure 2-24. Setup Time test fields.

1 **Setup Time.** Lets you enter a time to which the measured setup time is compared.

2 **Event True/False.** Lets you choose to look for the test to be satisfied when the event is found (true) or when the event is not found (False).

3 **Event Recognizer.** Lets you indicate the channels on which you want to check the setup time by marking them with a U. (Figure 2-26 shows a group of channels marked with a U.)

4 **Event Going True/False.** Lets you select the rising edge (Going True) or falling edge (Going False) of the clock event.

5 **Clock Event Recognizer.** Lets you define the channel group value corresponding to a clock pulse.

You can qualify data when performing the Setup Time or Hold Time tests. When you qualify data, you set up the test to require that a condition on another channel (signal) be met before taking the measurement. Qualifying data allows you to pinpoint when the setup and hold time testing is performed. For example, you could choose to perform setup time testing on only one RAM, or you could choose to perform two setup time tests with different requirements for different devices on the same bus.

Figure 2-25 shows an example of how to qualify SUT data for a setup time measurement. Figure 2-26 shows what the word recognizer part of the test would look to qualify the data in Figure 2-25.

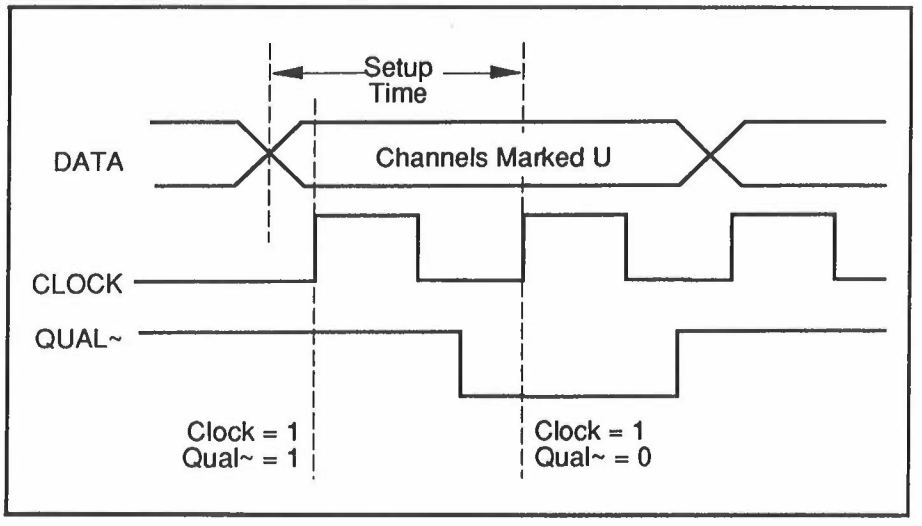


Figure 2-25. How to qualify SUT data for the Setup or Hold Time test.

```
                                    s  ms  µs  ns
TEST:   Setup Time          <  0,000,000,000,000,002.5
                               BIN    BIN    BIN
     Measured from             ch09   qual   Probe0
     data event  True          X      X      UUUUUUUU
                          (Mark data channels to be measured with U)
     to clock
     event Going True          1      0      XXXXXXXX
```

Figure 2-26. Event recognizer setup for Figure 2-25.

Hold Time -- This test looks for the data to be stable for a specified length of time after the clock pulse occurs. Marking data channels with a U causes the event recognizer to look for unstable data (rising edge, falling edge, or between thresholds in Dual-Threshold mode) on any of the selected channels. Figure 2-27 shows the SUT condition that the HSM looks for during this test. Figure 2-28 shows the fields found in the Hold Time test.

Refer to the previous page for a description of how to qualify data.

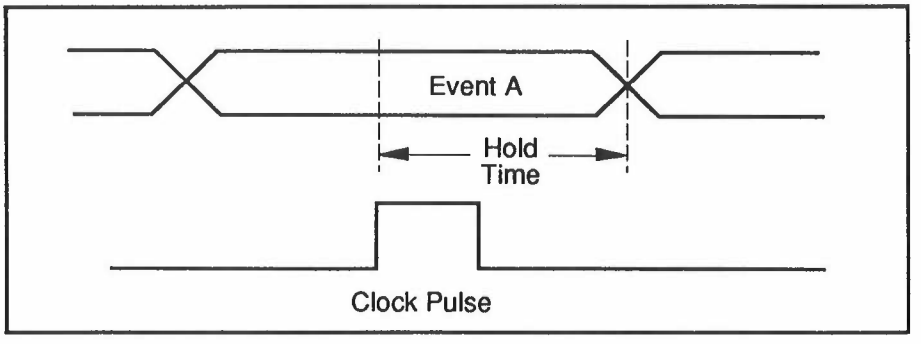


Figure 2-27. SUT condition that the Hold Time test looks for.

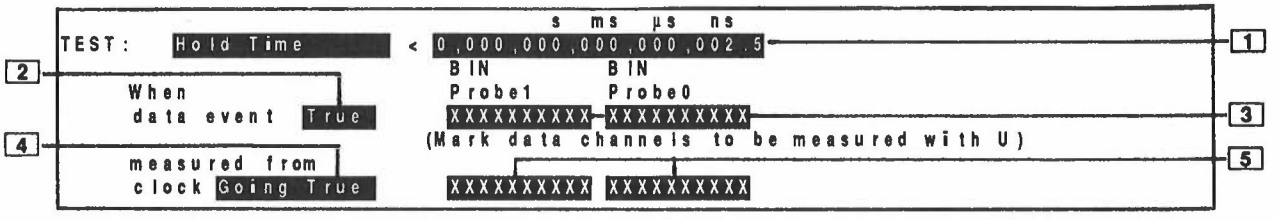


Figure 2-28. Hold Time test fields.

1 **Hold Time.** Lets you enter a time to which the measured hold time is compared.

2 **Event True/False.** Lets you choose to look for the test to be satisfied when the event is found (true) or when the event is not found (False).

3 **Event Recognizer.** Lets you indicate the channels on which you want to check the hold time by marking them with a U. (Figure 2-26 shows a group of channels marked with a U.)

4 **Event Going True/False.** Lets you select the rising edge (Going True) or falling edge (Going False) of the clock event.

5 **Clock Event Recognizer.** Lets you define the channel group value corresponding to a clock pulse.

The HSM keeps the result of each measurement available whenever possible.

Counter Measurements. You can use the Count test to count the number of occurrences of an event. The Count (and Time While) tests allow you to enter a second event recognizer value to use for resetting the counter (or timer). When the HSM detects the second or reset event, the counter (or timer) stops, retaining the count (or time) value up to the reset event.

Counter and timer values are retained until either another occurrence of the first event or another reset event is found. If two reset events occur before another first event is found, the counter (or timer) value will be zero after the second reset event.

Figure 2-29 shows how resetting the counter (or timer) works.

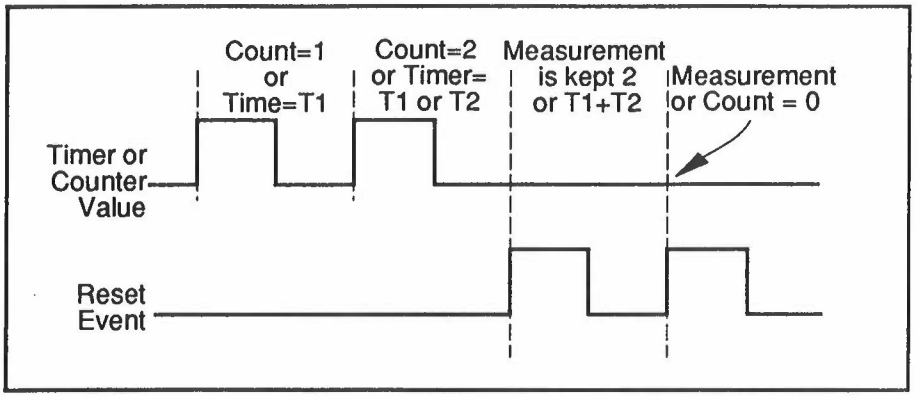


Figure 2-29. Resetting a counter or timer.

Count Test -- This test looks for a specific number of occurrences of an event. Figure 2-30 shows the SUT condition that the HSM looks for during this test. Figure 2-31 shows the fields found in the Count test. Enter the number of occurrences and the event values for which you are looking. An optional reset capability allows the counter to be reset and held reset as long as the reset event is valid.

Tests using the counter can count over 2.25 10^{15} occurrences of a single event.

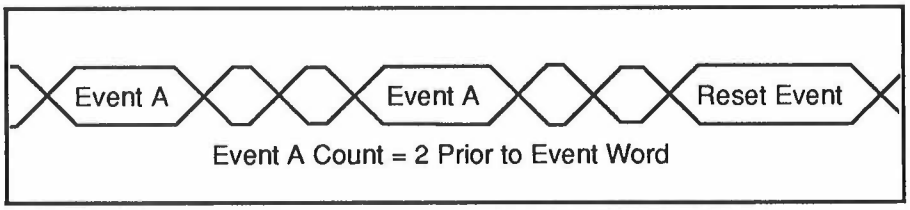


Figure 2-30. SUT condition that the Count test looks for.

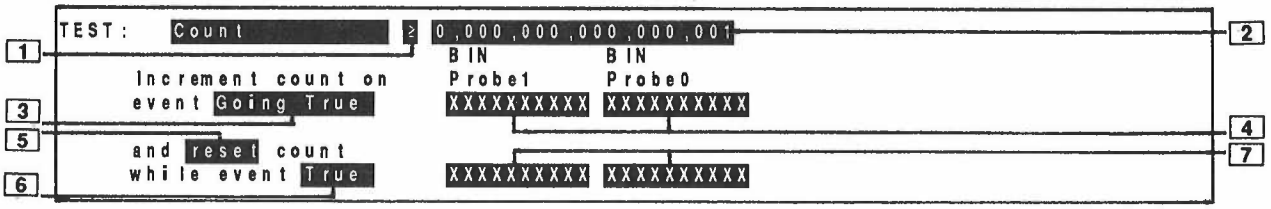


Figure 2-31. Count test fields.

1 **Qualifier.** Lets you look for the number occurrences of an event to be less than (<), or greater than or equal to (≥) a specified number.

2 **Count.** Lets you enter a count to which the number of times an event occurs is compared.

3 **Event Going True/False.** Lets you choose to begin counting when the event starts (Going True) or when the event ends (Going False).

4 **Event Recognizer.** Lets you enter the channel group value (event A in Figure 2-30) you want to count.

5 **Reset Count.** Lets you choose to reset the counter or not.

6 **Reset Event True/False.** Lets you choose to reset the counter either when the reset event occurs (True), or when it does not occur (False).

7 **Reset Event Recognizer.** Lets you enter the channel group value (reset event in Figure 2-30) on which to reset the counter.

Adding a Second Test

Adding a second trigger test effectively doubles the available event recognizers, timers, and counters. You can combine two trigger tests to create a more complex trigger or to perform two measurements simultaneously. Press F2: Add 2nd Test in the Hardware Analysis setup menu and a second default trigger test is added to the first. The F2 function key toggles to Delete 2nd Test when a second test is being used. Figure 2-32 shows how two trigger tests look.

There are two ways to connect the second test to the first test. You can perform the second test at the same time as the first test (At the Same Time) or to satisfy the first test before starting to perform the second (Followed By). Certain actions by the first test, such as Trigger Module, will halt the trigger specification. When these actions are specified for the first test, Followed By is not selectable.

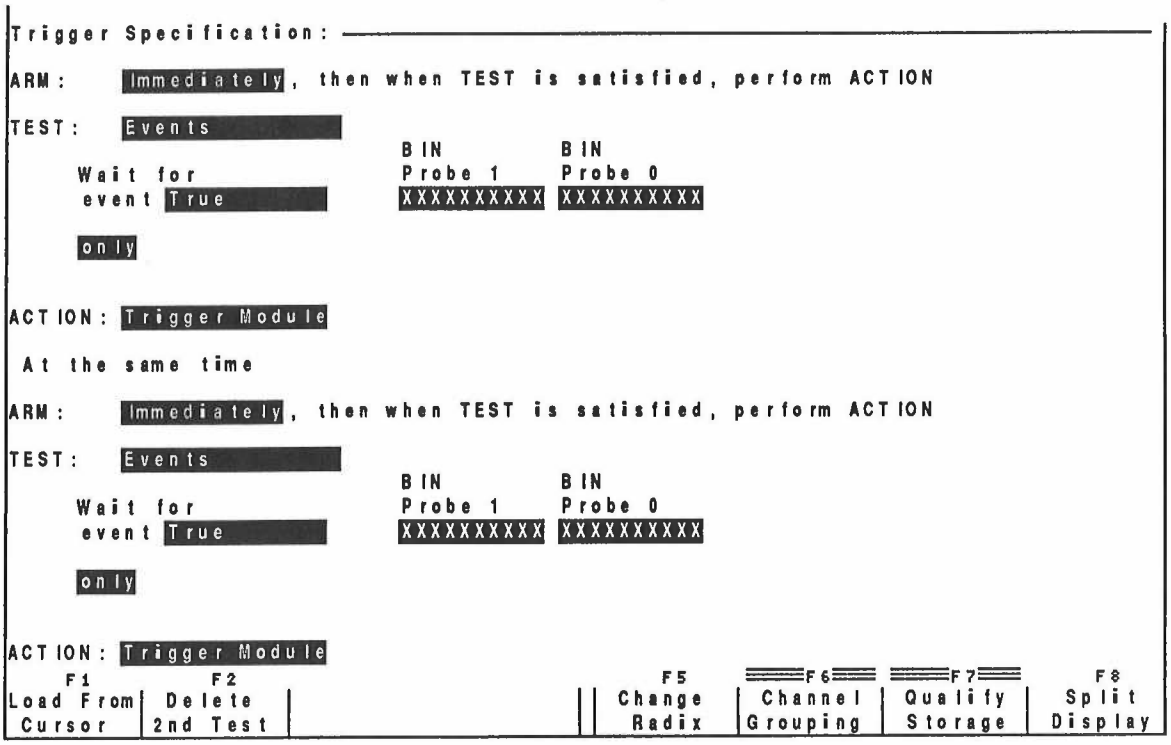


Figure 2-32. Second trigger test added.

Defining Channel Groups (F6)

The Channel Grouping submenu is used to organize the individual acquisition channels into logical groups and give each channel group a meaningful name. You can also use the default channel groups and names. Uses for channel groups include the following:

- perform searches through acquired data for specific channel group values
- define symbols (Edit menu) based on the channel grouping
- enter event recognizer values in the trigger specification
- display acquired data formatted according to the channel grouping

Channel. A single input signal line. Each channel is identified by a number on the probe.

Channel Group. A grouping of a number of channels from one or both probes to form a meaningful combination, such as a 16-bit data bus.

Use F6 to access the Channel Grouping submenu.

Figure 2-33 shows the default Channel Grouping submenu used with the Standard or High Performance leadsets operating in either the High Resolution or Dual-Threshold acquisition mode.

Two channels are acquired using the 2 GHz leadset.

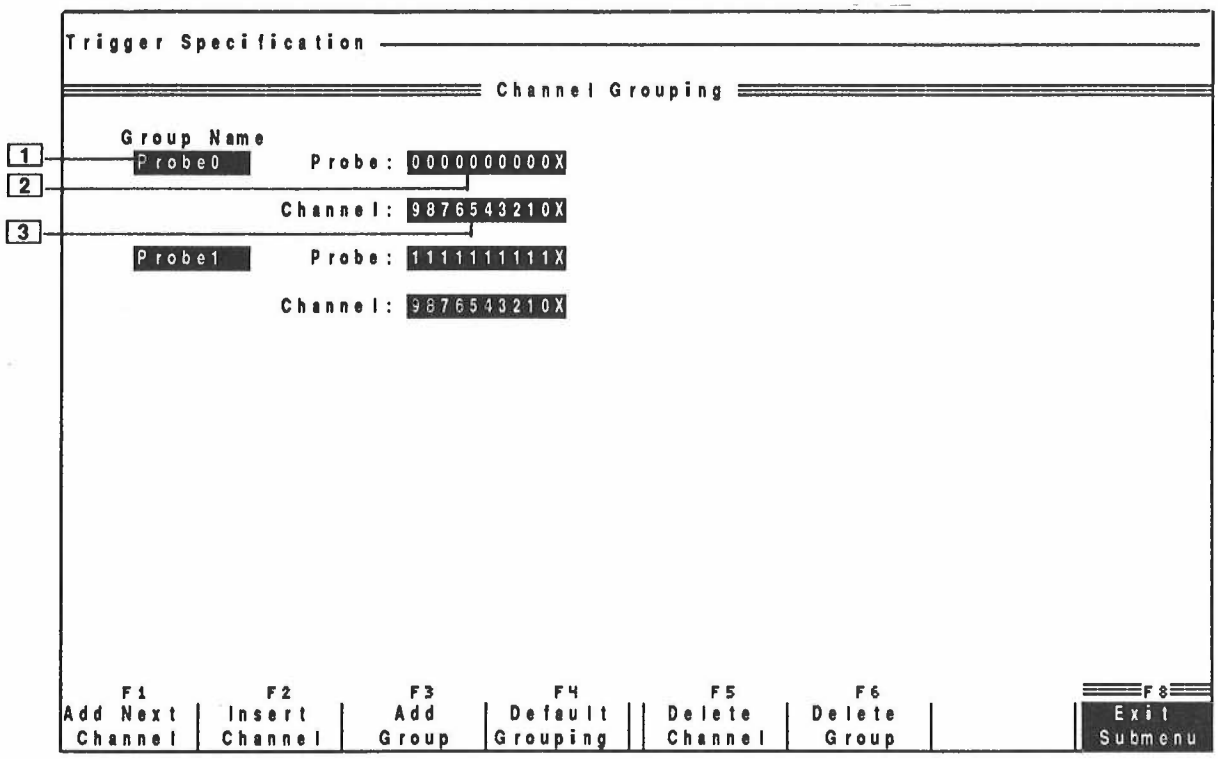


Figure 2-33. Channel Grouping submenu showing the default setup.

[1] **Group Name.** Lets you name each channel group. You can use up to eight alphanumeric characters in a name and can define up to 20 groups.

[2] **Probe.** Shows the number of the P6487 probe that is connected to the HSM. Front probe is 1 and rear probe is 0.

[3] **Channel.** Lets you select which probe channels to include in the group. The channels are the same for both the Standard and High Performance leadsets. You can assign the same channel to more than one group.

Function Keys

F1: Add Next Channel. Adds the next lower-numbered channel to the right of the cursor. You can only add the next channel when the cursor is in a Probe or Channel field.

F2: Insert Channel. Adds an undefined channel (an X) to the left of the cursor. You can only insert a channel when the cursor is in a Probe or Channel field.

F3: Add Group. Adds a new channel group below the group on which the cursor is positioned.

F4: Default Grouping. Replaces the current channel group setup with the default channel group setup as shown in this figure.

F5: Delete Channel. Deletes the channel the cursor is positioned on.

F6: Delete Group. Deletes the channel group the cursor is positioned on.

F8: Exit Submenu. Leaves the Channel Grouping submenu and returns to the Hardware Analysis setup menu. The Hardware Analysis setup menu (as well as other menus) will reflect the new channel groups.

The maximum number of channel groups allowed is 20.

You can enter up to eight alphanumeric characters in the channel group name field. The maximum number of channel groups allowed is 20. If you want to change a group name, you must change it in the Channel Grouping submenu. The Timing Diagram shows the channel groups vertically in descending bit order.

Changing the Radix of a Channel Group (F5)

You can change the input radix of the channel group from the Hardware Analysis setup menu or the Qualify Mask submenu. You can change the output radix of the channel group in the State Table or Timing Diagram display menus. The choices are binary (BIN), octal (OCT), hexadecimal (HEX), and symbol (SYMBOL).

A symbol table is a file of alphanumeric symbolic names associated with data values. If you select symbol as the radix, the symbol that corresponds to a channel group value is used in place of the actual group value. For a complete description of symbols, refer to *Using Symbols* in your system user's manual

Use F5 to change the radix.

Press the appropriate function key marked Change Radix in any of these menus or submenus to change the radix of the channel group the cursor is positioned on. Pressing the Change Radix function key cycles through the radix choices and changes the width of the channel group accordingly.

Qualifying Which Channels Cause Storage (F7)

The HSM stores data for all channels when a transition on any individual channel is detected. The Qualify Storage submenu lets you designate the channels on which you do not want the HSM to store data when a transition is detected. Use a number 1 to mark those channels for which you want the HSM to store data when a transition is detected, and a number 0 or an X to mark those channels for which you do not want the HSM to store data when a transition is detected.

Use F7 to access the Qualify Storage submenu.

The default designation is to store data when any channel changes logic levels (all channels are marked with 1s). Data present on any channel marked with a 0 or X will be acquired when a transition occurs on any channel marked with a 1. Figure 2-34 shows the Qualify Storage submenu. Refer also to *Displaying High-Speed Data* in this section.

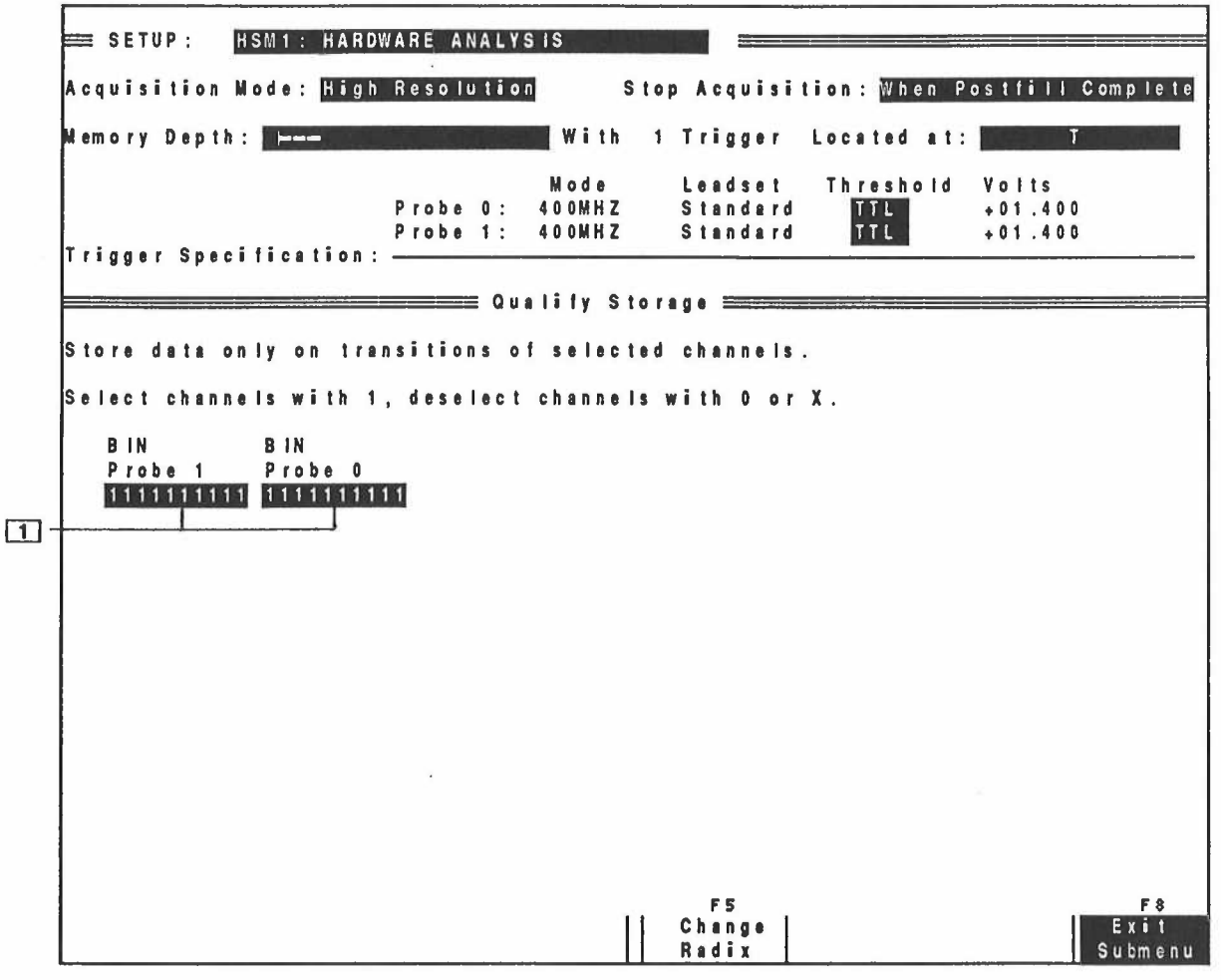


Figure 2-34. Qualify Storage submenu.

[1] **Qualify Storage.** Lets you designate the channels on which you do not want the HSM to detect a transition. Use a number 1 to mark those channels for which you want the HSM to detect transitions, and a number 0 or X to mark those channels for which you do not want the HSM to detect a transition. The default designation is to store the data on all channels when any single channel changes logic levels (transitional memory storage).

Function Keys

F1: Change Radix. Changes the input radix for the channel group field that the cursor is on.

F8: Exit Submenu. Closes the Qualify Storage submenu and returns the display to the Hardware Analysis setup menu.

Arming the HSM

When you "arm" the HSM as part of the trigger specification, you specify the condition that must be satisfied (usually a signal from another module) before the HSM will begin to perform the trigger test. Data is acquired and stored but the test is not started until arming is satisfied.

The arming choices are Immediately, On Signal 1, or On Signal 2. Choosing Immediately allows the HSM to immediately start looking for the event without waiting for a signal. Choosing On Signal 1 or On Signal 2 means that the TekLink signal must be set by another module before the HSM can begin the trigger test.

Defining the Event Recognizer

The event recognizer fields in the Hardware Analysis setup menu let you enter a value for each channel group. The HSM compares each data sample as it is acquired against these channel group values. The result determines if the event recognizer is satisfied.

The 0-F, X, and M terms are ANDed together. To satisfy the event recognizer, all data channels must match the specified event recognizer value.

The U and G terms are ORed together. Only one of the channels marked with an U or G need be true to satisfy the event recognizer.

If you use both ANDed and ORed terms in the same event recognizer value, then all of the ANDed terms and at least one of the ORed terms must be true to satisfy for the event recognizer.

0 - F. You may enter any value that is valid in the channel group input radix (Binary, Octal, Hexadecimal, or Symbol). You can also use function key F1: Load From Cursor to load the channel group value from the active data cursor in a display menu to the event recognizer field. Any dashes shown in a display menu will be given the value of X when loaded from the cursor. Three special characters can also be used to designate the channel condition: M, U, and G.

X. Enter an X for any channel against whose value you do not want to compare the event recognizer. The X (don't care value) is useable in all acquisition modes.

The M is only useable when operating in the Dual-Threshold mode. You can only use the M in the first event recognizer of each test.

M. Enter an M for any channel on which you are looking for the middle voltage range. This letter is useable only when operating in the Dual-Threshold acquisition mode. The middle voltage range is the voltage range between the two threshold voltages in Dual-Threshold mode. You can only use the M in the first event recognizer of each test.

U. Enter a U for any channel on which you are looking for unstable data in the High Resolution or Dual-Threshold acquisition modes. Unstable data is data on a channel or group of channels that is changing levels or that is between thresholds (Dual-Threshold mode only). Use this letter to measure setup and hold time on an entire channel group (for instance, a bus).

Only one event recognizer per test can use the U or G because they are mutually exclusive. You can use one or the other but not both in an event recognizer.

Only one event recognizer per test can use the U or G because they are mutually exclusive. You can use one or the other, but not both in an event recognizer.

G. Enter a G for any channel on which you are looking for a glitch. This letter is only useable when operating in the Dual-Threshold acquisition mode. A glitch is a transition out of a valid logic level and back with a duration of no more than 5 ns. Glitches show up as 5-ns wide pulses even though the glitch duration may be less. Use this letter to look for glitches on any channel(s) of an entire channel group (for instance, a bus).

Choosing the PRISM Action After Satisfying the Test

Once a test condition is satisfied, the PRISM will carry out an action. You can set up the PRISM to take a number of different actions after the test is satisfied. These actions are: Trigger Module, Trigger System, Reset Module, Trigger Module and Set Signal, Set Signal, and Do Nothing.

Trigger Module. This action causes the HSM to fill the specified amount of postfill memory. If multiple triggers are specified, the module goes on to search for the next trigger. Otherwise, the acquisition stops and data is displayed.

Trigger System. This action causes the HSM to trigger all modules in the system that haven't already triggered. Triggering the system also drives the Trigger Out signal (a BNC connector on the mainframe's rear panel). Refer to the system user's manual for a description of the Trigger Out signal.

Reset Module. This action causes the HSM to restart the trigger specification. Counters or timers are reset to 0. Acquisition memory and other modules are unaffected.

Trigger Module and Set a Signal. This action is the same as Trigger Module with one additional action, a TekLink signal is set. Other modules can use this signal for arming as part of their trigger specification. You shouldn't set a signal already being used in the Extend Events test.

Set Signal. This action causes the HSM to set a selected TekLink signal. Other modules can use this signal for arming or as part of their trigger test event.

Do nothing. This action causes the HSM to find the event or make the measurement specified by the selected test.

STARTING AND STOPPING THE ACQUISITION

To start acquiring data with the HSM, press Start, Auto, or Cont. For a description of these three execution keys, refer to your system user's manual.

After starting an acquisition, the probe connecting the HSM to the SUT begins looking at data from the channels to which it is connected. Each data sample is compared to the event recognizer to see if that data sample matches the values of the selected channel group. When the trigger occurs, the analyzer completes filling the postfill memory as defined by the trigger position field, and data is displayed.

If you press the Start/Stop key after starting an acquisition, but prior to satisfying the trigger specification, the HSM halts acquisition and displays STOP at the end of acquisition memory.

NOTE

The acquisition does not end until postfill is complete. If the trigger specification is such that the trigger doesn't occur, the acquisition never ends. Press the Stop key to view the current SUT activity.

DISPLAYING HIGH-SPEED DATA

You can view HSM data in the Timing Diagram or State Table display formats. The Timing Diagram display shows the changing logic levels for each channel as a digital waveform. The State Table display shows the changing channel group values as alphanumeric characters (in the selected display radix).

Figure 2-3 (earlier in this section) shows an example of the Timing Diagram display format. Refer to your system user's manual for an in-depth description of the Timing Diagram and State Table display formats.

When operating in the Dual-Threshold mode, three characters can be displayed representing a logic high, a logic low, and the middle state. A special fourth-state character is displayed for any channel on which data is between thresholds (the middle state) and then crosses both the high and low thresholds in one clock cycle. Searches are not allowed on this special character.

More than one data sample can be stored in each memory location depending on the sampling rate. A transition on any qualified channel causes the storage of an entire memory location. There are some cases where there will be more than one data sample displayed for a single transition on a channel qualified for storage (marked with a 1 in the Qualify Storage submenu).

Two data samples are stored in each memory location when operating in the High Resolution mode with the Standard or High Performance leadset. Ten data samples are stored in each memory location when operating in the High Resolution mode with the 2 GHz leadset. All data samples within each memory location are displayed. There may be transitions occurring on unqualified channels that are displayed due to their proximity to transitions on the qualified channels.

Acquisition Status Screen

The Acquisition Status screen appears immediately after an acquisition begins. The status information can help you spot a problem in your setup, such as a trigger specification that never occurs.

If the event is not found, then you should check the following:

- connections to the SUT
- channel grouping
- event recognizer value
- threshold voltage
- arming on a signal

When the acquisition is 100% complete, the data samples are displayed. For more information about the acquisition status display, refer to the *Acquiring Data* section in your system user's manual.

Timestamp Values and Shared Memory

Timestamp values show how much time has elapsed between data samples. They are also used to time-correlate data from other modules with HSM data.

Timestamp values and data samples share the same memory. As SUT data rates become very slow, more of the memory is used to store timestamp values. This means that there are fewer data samples in memory, although the HSM is actually acquiring data for a longer time. Refer to Figure 2-35 to see a graph showing the data rate versus the number of data samples stored in memory. Depending on the SUT data rate, a full-depth HSM memory will fill in from 61 µs to 60 s.

In some acquisition modes, data acquired at different closely spaced times is stored in the same memory location. For example, with a 2 GHz leadset, data from ten successive 500-ps time intervals is stored in one memory location.

You can see the timestamp value in the State Table display menu as time to the next sample (relative) or as time from the sample trigger (absolute). Refer to the display menu section of your system user's manual for a description of displayed timestamp values.

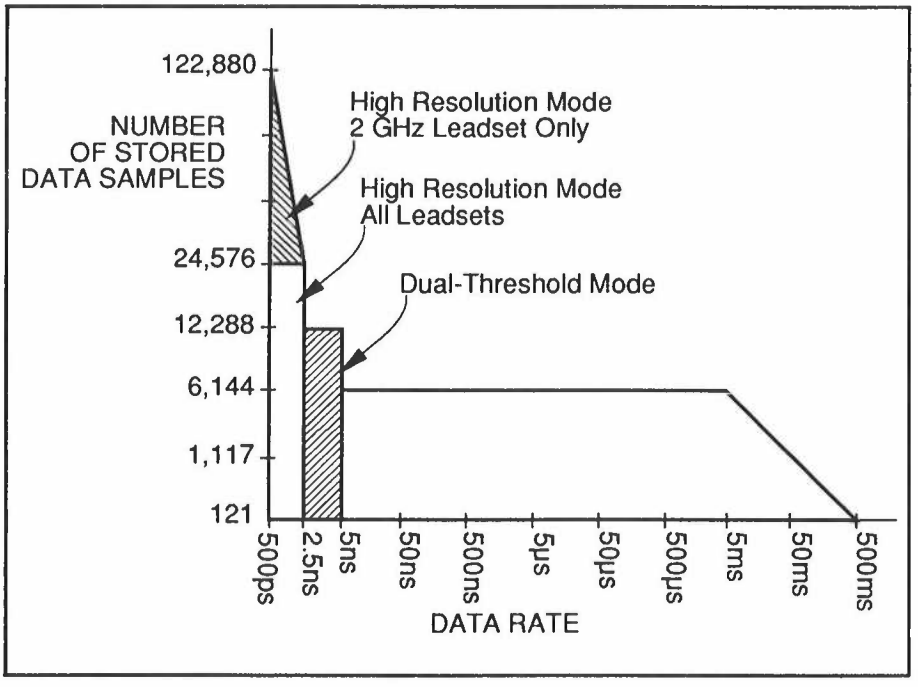


Figure 2-35. Data rate versus number of data samples stored in memory. This graph shows the maximum number of data samples stored in memory for various data rates.

SAVING HIGH-SPEED SETUPS

Once you define a Hardware Analysis Setup, you can save it on a floppy or hard disk using the Save Module Setup command in the SAVE/RESTORE Utility menu. Once the setup is saved, you can restore it for use in future logic analyzer sessions. Refer to the section *Using Utilities* in your system user's manual for complete instructions on using the Save Module Setup and Restore Module Setup commands. You should also note which leadsets are connected to which probe when saving a setup.

SAVING HIGH-SPEED DATA

You can save the current HSM acquisition memory as a reference memory. The memory can be saved on either floppy disk or hard disk using the Save Acqmem and Save Refmem commands in the SAVE/RESTORE Utility menu. Once you have saved them, you can restore the data by using the Restore Refmem command in the SAVE/RESTORE Utility menu. For instructions on using the Save Acqmem, Save Refmem, and Restore Refmem commands refer to the section *Using Utilities* in the system user's manual.

Appendix A:
INSTALLING SOFTWARE

You must install the software that came with the Hardware Analysis Module. If you have a hard drive in your PRISM, follow the Hard Drive directions. If you do not have a hard drive in your PRISM, follow the Floppy Drive directions.

Two disks were shipped to you with the HSM. One disk contains PRISM 3000 Series system software and the other disk contains the Hardware Analysis software. Two directories reside on the application software's floppy disk: Device and Support.

Hard Drive

You can use the Install System operation to copy each file in every directory on the PRISM system and HSM application floppy disks into the corresponding directories on your hard drive. Perform the following steps to install the PRISM system software as well as the HSM application software in your PRISM system:

1. Power on the PRISM.
2. Insert the system software floppy disk into the floppy disk drive located on the front of the PRISM mainframe.
3. Access the Disk Servies menu (press Util and cycle through the choices to Disk Services).
4. Select Install System in the operation field.
5. Press F1 to start the install operation. A message tells you when the software is successfully installed.
6. Remove the system floppy disk and insert the HSM application software floppy disk into the floppy disk drive.
7. Press F1 to start the install operation. A message tells you again when the software is successfully installed.
8. Power your mainframe off and on to copy the HSM application software you just installed on the hard disk to the PRISM system RAM.

Once you have installed the software on the hard disk, it is automaticslly loaded whenever you power up your PRISM mainframe.

Floppy Drive

Perform the following steps to install the HSM software in your PRISM system:

1. Power up your PRISM mainframe and install the system software floppy disk into the floppy disk drive located on the front of the PRISM mainframe.
2. When the system software is successfully loaded, the PRISM will prompt you to load application software.

3. Remove the system floppy disk and insert the HSM application software floppy disk into the floppy disk drive.
4. The PRISM will display a message when the application software is successfully loaded. Remove the application floppy disk and insert a floppy disk on which you can store setups and reference memories.

INSTALLING HARDWARE

If you ordered your HSM application module when you ordered your system, the PRISM will arrive with the module already installed. If you ordered your HSM application after you ordered your PRISM, you must have a qualified service technician install the application module in your PRISM mainframe.

WARNING

Serious electric shock hazards exist within the mainframe. Do not remove covers. Installation of application modules should only be performed by a qualified service technician.

Appendix B: SPECIFICATIONS

This section lists two types of specifications: (1) those that are classified as environmental, physical, or "static" specifications (specifications that cannot be verified by the user); and (2) those that are actual operational parameters (specifications that are user-verifiable).

The following terms are used in the specification tables:

Characteristic: A property of the product.

Performance Requirement: The primary performance characteristics of the product that can be verified using verification procedures.

Supplemental Information: Statements that describe typical performance for characteristics of secondary importance (those that are not usually verified using verification procedures) or statements that further explain related performance requirements.

CHARACTERISTICS/SPECIFICATIONS

The performance characteristics in this section are valid under the following condition:

1. The 30HSM Acquisition Module and P6487 High-Speed Probe must be operating in an environment as specified in Table B-1 of the applicable mainframe service manual.
2. A warm-up period of at least 20 minutes must precede the verification/operational procedures.

The following tables list the specifications and performance characteristics of the 30HSM Acquisition Modules, P6487 High-Speed Probe, and associated leadsets.

Table B-1
30HSM FUNCTIONAL REQUIREMENTS

Characteristic	Description
Number & Type of Probes supported	2, P6487 High-Speed Probe
Number of Channels per Probe Standard & High Performance Leadsets 2 GHz Leadset	 10 channels in High Resolution & Dual-Threshold modes 2 channels in High Resolution mode only
Acquisition Rate High Resolution acquisition mode Dual-Threshold acquisition mode	 400 MHz 200 MHz
Acquisition Memory Size	12,288 memory locations (for data and timestamps)
Depth	A single memory can fill all, 1/2, 1/4, 1/8, 1/16, 1/32, or 1/64.
Trigger Mode Enhanced Trigger Immediate	 If the trigger occurs before the prefill is satisfied, the unfilled prefill locations will be used for additional postfill.
Trigger Position	One of five user-selectable positions
Storage Qualification	Transitions on any channel not qualified for storage causes the storage of one data sample in memory . Channels may be qualified by the user and are qualified automatically if they are not used in the Channel Grouping submenu.
Arm	Immediately or on a selected TekLink signal
Number of Trigger Tests	2
Trigger Tests Counter Range Timer Range	 1 to over 2.25 10^{15} 2.5 ns to over 65 days (5.625 million seconds) with 2.5 ns resolution in High Resolution mode and 5 ns resolution in Dual-Threshold mode
Actions	Trigger module, trigger system, reset module, set signal, trigger module and set signal, or do nothing

Table B-2
30HSM PERFORMANCE REQUIREMENTS

Characteristic	Performance Requirement	Supplemental Information
TekLink Clocks M_CLK S_CLK	 50 MHz 12.5 MHz	 Generated by MPU board Refer to MPU specifications
Power Supplies +5 V(Vcc), +12 v, -12 V +3 V sink +1.6 V sink		Module receives power from mainframe. Refer to your mainframe specifications.
VL, VH, and VTH Lines from the HSM module Voltage Range Step Size DAC Range Relationship Output Current	 0 to 8.53V 25 mV 0 to 4,095 0 on DAC = 0.0 volts -10 mA to +10 mA	 independently programmable 25 mV = 12 AC steps 12-bit binary
System Trigger Pulse Width	 160 ns minimum required	
SIGNAL (1-4) TekLink lines Pulse Width	 80 ns minimum required	

Table B-3
30HSM ENVIRONMENTAL SPECIFICATIONS

Characteristic	Description	Supplemental Information
Temperature Operating Non-operating	 0 to +50° C -55 to +75° C	Meets MIL-T-28800D, class 5
Thermal Switch Threshold	85° C	Switch closes when temperature exceeds 85° C
Relative Humidity	20% to 95% (Estimated)	Exceeds MIL-T-28800D, class 5
Altitude Operating Non-operating	 15,000 ft (4.5 km) 50,000 ft (15 km)	Exceeds MIL-T-28800D, class 3
Vibration	.015" (0.380 mm) @ 10 Hz to 55 Hz	Meets or exceeds MIL-T-28800D, class 5
Shock	30 Gs @ 11 mS	MIL-T-28800D, class 3
Packaged Product Vibration and Shock	1" (25 mm) @ 270 RPM	

Table B-4
30HSM PHYSICAL SPECIFICATIONS

Characteristic	Description
Product Dimensions Length Width Weight	 15.00" (38.10 cm) 9.25" (23.49 cm) 1.60 lbs. (0.73 Kg) approximate weight

Table B-5
30HSM SAFETY AND REGULATORY SPECIFICATIONS

Characteristic	Description
Electromagnetic Compatibility (EMI) without probes	Complies with VDE 0871, Level B
Safety	Complies with UL 1244, CSA 556B, IEC 348

Table B-6
30HSM RELIABILITY SPECIFICATIONS

Characteristic	Description
Mean Time Between Failure	Failure rate <1 per 10,000 hours (calculated), excluding probes and leadsets

Table B-7
P6487 HIGH-SPEED PROBE FUNCTIONAL REQUIREMENTS

Characteristic	Description
Channels	10
Channel-to-channel Skew	4.5 ns
P6487-to-P6487 Skew	4.5 ns
Acquisition Rate Transitional	 400 MHz (2.5 ns resolution) max. (single threshold) 200 MH z (5 ns resolution) max. (dual threshold)
Glitch Latch	Dual-Threshold mode only
Operational Modes Acquisition Modes Diagnostic Modes	 High Resolution and Dual-Threshold Test Pattern Generator

Table B-8
P6487 HIGH-SPEED PROBE PERFORMANCE REQUIREMENTS

Characteristic	Characteristic	Supplemental Information
Probe Clock Frequency	 200 MHz ±1%	 Phase locked to M_CLK
Output Voltages to Leadsets +5 V +3 V +12 V -12 V Ground (0V)	 4.5 V to 5.0 V 2.7 V to 3.0 V 11 V to 13 V -11 V to -13 V 0 to 100 mV	 Referenced to mainframe ground
Data Output Channels -Voh -Vol Rise/Fall Time	 Vcc-1.16 V to Vcc - 0.65 V 3.8 V typical Vcc - 2.00 V to Vcc - 1.585 V 3.0 V typical <2 ns, 20% to 80%	Single-ended ECL Vee = Gnd Vcc = +5 V

Table B-9
P6487 HIGH-SPEED PROBE ENVIRONMENTAL SPECIFICATIONS

Characteristic	Description	Supplemental Information
Temperature Operating Non-operating	 -15° to +55° C -62° to +85° C	Meets MIL-T-28800D, class 3
Relative Humidity	5% to 95% (Estimated value)	Exceeds MIL-T-28800D, class 3
Altitude Operating Non-operating	 15,000 ft (4.5 km) 50,000 ft (15 km)	Exceeds MIL-T-28800D, class 3
Vibration	0.25" (0.635 mm) @ 10 Hz to 55 Hz P-P for 75 minutes total	Meets or exceeds MIL-T-28800D, class 3
Shock	50 Gs @ 11 ms	MIL-T-28800D, class 3
Bench Handling Drop Test	Drop from height of 3 ft (91 cm); 3 drops on each side (18 total)	Meets or exceeds MIL-T-28800D, class 3
Electrical Discharge	Will withstand a discharge of 17 kV through a 1kΩ resistor in series with a 500 pF capacitor	

Table B-10
P6487 HIGH-SPEED PROBE PHYSICAL SPECIFICATIONS

Characteristic	Description
Probe Dimensions, approximately Length Width Height Cable Length	 4.30" (10.92 cm) 3.00" (7.62 cm) 0.70" (1.78 cm) 80" (2 meters) ±10% (from probe to module)
Weight	10.50 0z (0.31 kg) with Module interface cable

Table B-11
P6487 HIGH-SPEED PROBE SAFETY AND REGULATORY SPECIFICATIONS

Characteristic	Description
Designed Operation	Designed to operate using low-voltage, low-power signals (less than 42.4 Vac peak or less than 60 Vdc between any two terminals and less than an additional 150 watts available).
Electromagnetic Compatibility	Probes are exempt from VDE per German Postal Regulation 1046/1984 Par. 2, Sect. 1.7.1
Safety	Complies with UL 1244, CSA 556B, when used with a PRISM 3000 Series mainframe

Table B-12
P6487 HIGH-SPEED PROBE RELIABILITY SPECIFICATIONS

Characteristic	Description
Mean Time Between Failure	>20,000 hours (Calculated value)

Table B-13
STANDARD LEADSET FUNCTIONAL REQUIREMENTS

Characteristic	Description
Number of Channel Conductors	10
Number of Reference Conductors	1
Number of Ground Conductors	1

Table B-14
STANDARD LEADSET PERFORMANCE REQUIREMENTS

Characteristic	Performance Requirement	Supplemental Information
Bandwidth	100 MHz @ 3dB point	
Input Resistance		165 kΩ nominal connected to the P6487 probe
Input Capacitance		<11 pF
Reference Range	±25 V	
Input Threshold Range Threshold Accuracy Step Size	±10 V ±100 mV 50 mV	
Input Voltage Range	±12 V from threshold	
Minimum Overdrive	500 mV	
Maximum Non-Destructive Input Voltage Range	±50V	
Minimum Pulse Width	5 ns	Operating in High Resolution

Table B-15
STANDARD LEADSET ENVIRONMENTAL SPECIFICATIONS

Characteristic	Description	Supplemental Information
Temperature Operating Non-operating	 -15° to +55° C -62° to +85° C	Meets MIL-T-28800D, class 3
Thermal Switch Threshold	85° C	Switch closes when temperature exceeds 85° C
Relative Humidity	5% to 95% (Estimated value)	Exceeds MIL-T-28800D, class 3
Altitude Operating Non-operating	 15,000 ft (4.5 km) 50,000 ft (5 km)	Exceeds MIL-T-28800D, class 3
Vibration	0.25" (0.64 mm) @ 10 to 55 Hz P-P for 75 minutes total	Meets or exceeds MIL-T-28800D
Shock	50 Gs	

Table B-16
STANDARD LEADSET PHYSICAL SPECIFICATIONS

Characteristic	Description
Leadset Dimensions Case Length Case Width Case Height Lead Length	 3.0" (7.62 cm) 1.5" (3.81 cm) 0.7" (1.78 cm) 9.0" (22.86 cm)
Weight	2.0 oz. (56.8 g)

Table B-17
HIGH PERFORMANCE LEADSET FUNCTIONAL REQUIREMENTS

Characteristic	Description
Number of Channel Conductors	10
Number of Reference Conductors	10
Number of Ground Conductors	1

Table B-18
HIGH PERFORMANCE LEADSET PERFORMANCE REQUIREMENTS

Characteristic	Performance Requirement	Supplemental Information
Bandwidth	200 MHz @ 3dB point	
Input Resistance		102 kΩ nominal connected to the P6487 probe
Input Capacitance		<11 pF
Reference Range	-10 V to +15 V	
Input Threshold Range Threshold Accuracy Step Size	±5 V ±50 mV 25 mV	
Input Voltage Range	±6 V from threshold	
Minimum Overdrive	250 mV	
Maximum Non-Destructive Input Voltage Range	±50V	
Minimum Pulse Width	4.5 ns	Operating in High Resolution

Table B-19
HIGH PERFORMANCE LEADSET ENVIRONMENTAL SPECIFICATIONS

Characteristic	Description	Supplemental Information
Temperature Operating Non-operating	 -15° to +55° C -62° to +85° C	Meets MIL-T-28800D, class 3
Relative Humidity	5% to 95% (Estimated value)	Exceeds MIL-T-28800D, class 3
Altitude Operating Non-operating	 15,000 ft. (4.5 km) 50,000 ft. (15 km)	Exceeds MIL-T-28800D, class 3
Vibration	0.25" (0.64 mm) @ 10 to 55 Hz P-P for 75 minutes total	Meets or exceeds MIL-T-28800D
Shock	50 Gs	

Table B-20
HIGH PERFORMANCE LEADSET PHYSICAL SPECIFICATIONS

Characteristic	Description
Leadset Dimensions Case Length Case Width Case Height Lead Length	 3.0" (7.62 cm) 1.5" (3.81 cm) 0.7" (1.78 cm) 9.0" (22.86 cm)
Weight	2.0 oz. (56.8 g)

Table B-21
2 GHz LEADSET FUNCTIONAL REQUIREMENTS

Characteristic	Description
Number of Channel Conductors	2
Number of Reference Conductors	2
Number of Ground Conductors	1

Table B-22
2 GHz LEADSET PERFORMANCE REQUIREMENTS

Characteristic	Performance Requirement	Supplemental Information
Bandwidth	400 MHz @ 3dB point	
Input Resistance	20 kΩ nominal	20 kΩ nominal connected to the P6487 probe
Input Capacitance	2.5 pF	2.5 pF
Reference Range	-5 V to +5 V	
Input Threshold Range Threshold Accuracy Step Size	±5 V ±35 V 25 mV	
Input Voltage Range	±6 V from threshold	
Minimum Overdrive	50 mV	
Maximum Non-Destructive Input Voltage Range	±15 V	

Table B-23
2 GHz LEADSET ENVIRONMENTAL SPECIFICATIONS

Characteristic	Description	Supplemental Information
Temperature Operating Non-operating	 -15° to +55° C -62° to +85° C	Meets MIL-T-28800D, class 3
Relative Humidity	5% to 95% (Estimated value)	Exceeds MIL-T-28800D, class 3
Altitude Operating Non-operating	 15,000 ft (4.5 km) 50,000 ft (15 km)	Exceeds MIL-T-28800D, class 3
Vibration	0.25" (0.64 mm) @ 10 to 55 Hz P-P for 75 minutes total	Meets or exceeds MIL-T-28800D
Shock	50 Gs	

Table B-24
2 GHz LEADSET PHYSICAL SPECIFICATIONS

Characteristic	Description
Leadset Dimensions Case Length Case Width Case Height Lead Length	 3.0" (7.62 cm) 1.5" (3.81 cm) 0.7" (1.78 cm) 9.0" (22.86 cm)
Weight	2.0 oz. (56.8 g)

Index

A

C

D

E

F

G

H

I

L

M

P

Q

R

S

T

U

V

W

X

MANUAL CHANGE INFORMATION

At Tektronix, we continually strive to keep up with latest electronic developments by adding circuit and component improvements to our instruments as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we can't get these changes immediately into printed manuals. Hence, your manual may contain new change information on following pages.

A single change may affect several sections. Since the change information sheets are carried in the manual until all changes are permanently entered, some duplication may occur. If no such change pages appear following this page, your manual is correct as printed.

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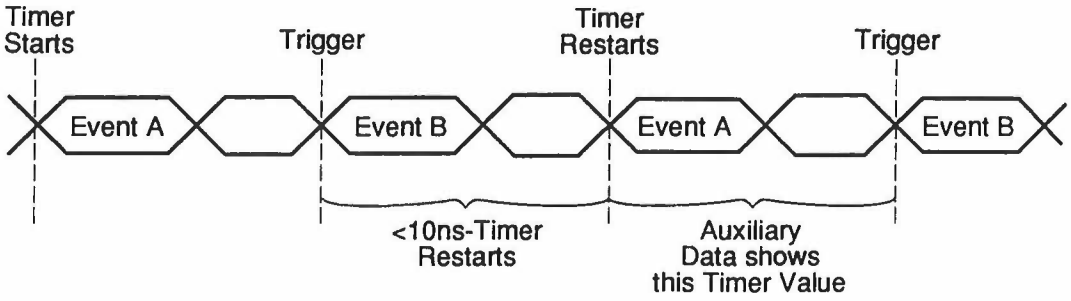
30HSM or 3001HSM Version 1.0 Release Notes

The following list describes specification irregularities associated with Version 1.0 of the PRISM Hardware Analysis Module application software.

- When using the Extend Events test, an unexpected warning message may be displayed. The message says "Warning: The same signal has been used for ARM, TEST, or ACTION."
- When changing from operating in the High Resolution mode to the Dual Threshold mode, Glitch (G) and unstable (U) characters may appear in both word recognizers of the same test at the same time. This only occurs when using both word recognizers in a test where a G has been previously entered in Dual Threshold mode and a U previously entered in the High Resolution mode. Enter an X (don't care) in the word recognizer value field to correct this.
- The counter/timer values (viewed in the Auxiliary Data Display submenu) may not be zero if viewed before running the first acquisition after powering up the system.
- When operating in the Dual Threshold mode, the second word recognizer only has a single threshold whose value is set to Vhigh (the upper threshold value in Dual Threshold mode). When triggering on an event with 1s in the second word recognizer, that recognizer will see both 0s and Ms as being below the threshold. Similarly, when triggering on an event with 0s in the second word recognizer, that recognizer will again see both 0s and Ms as being below the threshold.
- No timer data is displayed in the Auxiliary Data Display submenu for the predefined Hold Time test.
- For any of the timer tests (Delay test, Accumulate Time test, Period test, etc.), if the first event (starts the timer) occurs within 10 ns after the trigger event (second event), the timer starts another measurement. The value in the Auxiliary Data Display submenu will show the time from that second occurrence of the first event to the second trigger event. Correct values are displayed in all other menus. Refer to the following figure.



- When the actions Trigger the Module and Trigger the System are both selected in a two-test setup, the Trigger the System action is performed regardless of which test is satisfied.

061-3795-00
PRODUCT GROUP 5E

FIRST PRINTING MARCH 1990

- When you change a leadset, you must reconfigure the hardware in the Setup menu.
- The TRIG (trigger indicator) displayed in the State Table display may be 2.5 ns after the actual trigger because of the way that data is sampled by the PRISM in conjunction with the data rate of the system under test.
- You must have the same types of leadsets connected when you restore a setup as were connected when that setup was saved.
- The 30HSM does not latch TekLink signals. In the State section, these signals are only set until the memory of the module asserting the TekLink signal is finished post-filling its memory. To assure that the TekLink signal is recognized by the 30HSM, set the action of the asserting module to extend the post-fill time. You can extend the post-fill time of the acquisition indefinitely by performing the Do Nothing action.
- The last sample of data in the State Table display is duplicated so that you can see the duration of the sample.
- Symbol values cannot be defined with middle state (M), glitch (G), unstable (U), or fourth state data.

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MANUAL CHANGE INFORMATION

Date: March 1, 1990 **Change Reference:** C2/390

Product: 30HSM User's Manual **Manual Part Number:** 070-6674-00

DESCRIPTION

Product Group 57

THIS IS A PAGE PULL AND REPLACEMENT PACKAGE

1. Remove the designated pages from your manual and insert the attached pages: B-9 and B-10.

2. Keep this cover sheet in the Change Information section at the back of your manual for a permanent record.

Table B-19
HIGH PERFORMANCE LEADSET ENVIRONMENTAL SPECIFICATIONS

Characteristic	Description	Supplemental Information
Temperature Operating Non-operating	 -15° to +55° C -62° to +85° C	Meets MIL-T-28800D, class 3
Relative Humidity	5% to 95% (Estimated value)	Exceeds MIL-T-28800D, class 3
Altitude Operating Non-operating	 15,000 ft. (4.5 km) 50,000 ft. (15 km)	Exceeds MIL-T-28800D, class 3
Vibration	0.25" (0.64 mm) @ 10 to 55 Hz P-P for 75 minutes total	Meets or exceeds MIL-T-28800D
Shock	50 Gs	

Table B-20
HIGH PERFORMANCE LEADSET PHYSICAL SPECIFICATIONS

Characteristic	Description
Leadset Dimensions Case Length Case Width Case Height Lead Length	 3.0" (7.62 cm) 1.5" (3.81 cm) 0.7" (1.78 cm) 9.0" (22.86 cm)
Weight	2.0 oz. (56.8 g)

Table B-21
2 GHz LEADSET FUNCTIONAL REQUIREMENTS

Characteristic	Description
Number of Channel Conductors	2
Number of Reference Conductors	2
Number of Ground Conductors	1

Table B-22
2 GHz LEADSET PERFORMANCE REQUIREMENTS

Characteristic	Performance Requirement	Supplemental Information
Input Resistance	20 kΩ nominal	20 kΩ nominal connected to the P6487 probe
Input Capacitance	2.5 pF	2.5 pF
Reference Range	-5 V to +5 V	
Input Threshold Range Threshold Accuracy Step Size	±5 V ±35 V 25 mV	
Input Voltage Range	±6 V from threshold	
Minimum Overdrive	200 mV	
Maximum Non-Destructive Input Voltage Range	±15 V	
Minimum Pulse Width	2.5 ns to capture 4.5 ns to trigger 5.0 ns	Pulse widths <6.5 ns may display more then one transition on the trailing edge of the pulse Single channel Across both channels of a single P6487 probe

Table B-23
2 GHz LEADSET ENVIRONMENTAL SPECIFICATIONS

Characteristic	Description	Supplemental Information
Temperature Operating Non-operating	 -15° to +55° C -62° to +85° C	Meets MIL-T-28800D, class 3
Relative Humidity	5% to 95% (Estimated value)	Exceeds MIL-T-28800D, class 3
Altitude Operating Non-operating	 15,000 ft (4.5 km) 50,000 ft (15 km)	Exceeds MIL-T-28800D, class 3
Vibration	0.25" (0.64 mm) @ 10 to 55 Hz P-P for 75 minutes total	Meets or exceeds MIL-T-28800D
Shock	50 Gs	

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MANUAL CHANGE INFORMATION

Date: March 1, 1990 **Change Reference:** C1/390

Product: 30HSM User's Manual **Manual Part Number:** 070-6674-00

DESCRIPTION

Product Group 57

THIS IS A PAGE PULL AND REPLACEMENT PACKAGE

1. Remove the designated pages from your manual and insert the attached pages: 1-1, 1-2, 2-1, 2-2, 2-9 through 2-12, 2-39, 2-40, B-1 through B-4, B-7 through B11, I-5, and I-6.

2. Keep this cover sheet in the Change Information section at the back of your manual for a permanent record.

Section 1: 30HSM DESCRIPTION

The PRISM 3000 Hardware Analysis Module (30HSM) is a data acquisition module designed to sample data with a resolution up to 500 ps using the 2 GHz leadset. The Hardware Analysis Module comes equipped with two P6487 High-Speed Probes and two Standard leadsets. Using the Standard leadset, this module can sample data with a resolution of up to 2.5 ns (400 MHz). You can use the Hardware Analysis Module in any PRISM 3000 Series mainframe.

With the Hardware Analysis Application Module you can develop a simple yet powerful trigger test specification. There are fifteen trigger tests to help you solve a variety of problems that occur with high-speed hardware. Each test (located in the setup menu) can consist of one or two event recognizers, counters, timers, and intermodule TekLink signals. There are tests for:

- detecting specified bus values (an event)
- detecting specified bus values extended across several 30HSMs (a 21-bit or wider event)
- measuring the duration of specified bus values
- measuring the period (cycle rate) of a specified bus channel value
- accumulating the total time between a pair of specified bus values that occur and reoccur
- counting the number of times a specified bus value occurs
- accumulating the total time in which a single specified bus value occurs and reoccurs
- measuring the setup time between two specified bus values
- measuring the hold time between two specified bus values

The trigger test specification can consist of one or two tests that may be performed sequentially or concurrently. Trigger test selections work together to provide you with a powerful trigger machine. You can set the PRISM to perform a variety of actions based on the result of each test.

DATA SAMPLING SPEEDS

Data can be acquired using either one or two P6487 High-Speed Probes. Three types of leadsets are presently available for the P6487 probe: the Standard, the High Performance, and the 2 GHz leadset. Table 1-1 shows which 30HSM acquisition modes can be used with which leadsets and the maximum sampling speed associated with each combination. The P6487 High-Speed Probe is the only probe used with this module.

Table 1-1
DATA SAMPLING SPEEDS BY ACQUISITION MODES AND LEADSETS

30HSM Acquisition Mode	Leadset Used and Maximum Data Sampling Speed		
	Standard	High Perf.	2 GHz
High Resolution Mode	400 MHz	400 MHz	2 GHz
Dual-Threshold Mode	200 MHz	200 MHz	*N/A

*N/A means that the leadset does not operate in this acquisition mode.

Other features provided by the 30HSM module are as follows:

- data is transitionally stored in memory
- glitches as small as 2.5 ns are detected
- signals can be sent or received to or from other PRISM modules (TekLink) or devices (external trigger in/out)
- acquired data is time-stamped
- acquired data can be viewed in both State Table or Timing Diagram display menus with data from other modules (two or more modules acquiring data simultaneously). Refer to the mainframe user's manual for a description of the various display formats.

CONVENTIONS USED IN THIS MANUAL

This manual uses the following conventions:

- SUT refers to the system under test.
- An X represents Don't Care when designating logic level signal values.
- PRISM refers to any of the PRISM 3000 Series mainframes.
- HSM refers to either the 30HSM Hardware Analysis Module or to the 3001HSM Hardware Analysis Logic Analyzer.

Section 2: USING THE HARDWARE ANALYSIS MODULE

The 30HSM is an easy-to-use yet powerful high-speed data acquisition module. In this section you will find information about the HSM including:

- an overview of the Hardware Analysis setup menu
- descriptions of each specific trigger test
- directions on how to start acquiring SUT data with the HSM

The SUT's data rate and the number of channels you want to monitor determines which leadset is best suited for you. (Table 1-1 shows which leadsets can be used with each acquisition mode and the maximum data sampling speed of each combination.)

Data from the SUT is acquired in acquisition memory. You can then view the data samples in a variety of displays including the State Table and Timing Diagram Display formats. You can also store the data to a reference memory to recall and analyze.

To use the HSM, you must make the following connections:

1. Connect one or two P6487 High-Speed Probes to the PRISM mainframe.
2. Connect a leadset to each P6487 probe. (There are three types of leadsets available.)
3. Connect the leadset(s) to the SUT.

A description of the P6487 probe and each leadset, and instructions on how to connect them are on the following pages.

GETTING STARTED USING THE HSM

This section tells you how to quickly connect the HSM to your SUT and acquire data. This procedure uses one HSM, one P6487 High-Speed Probe, one Standard leadset, and your SUT. For details regarding each specific leadset, refer to the *Leadsets* and *Making HSM-to-SUT Connections* descriptions later in this section. Use Figure 2-1 and the following procedure to connect the HSM to the SUT.

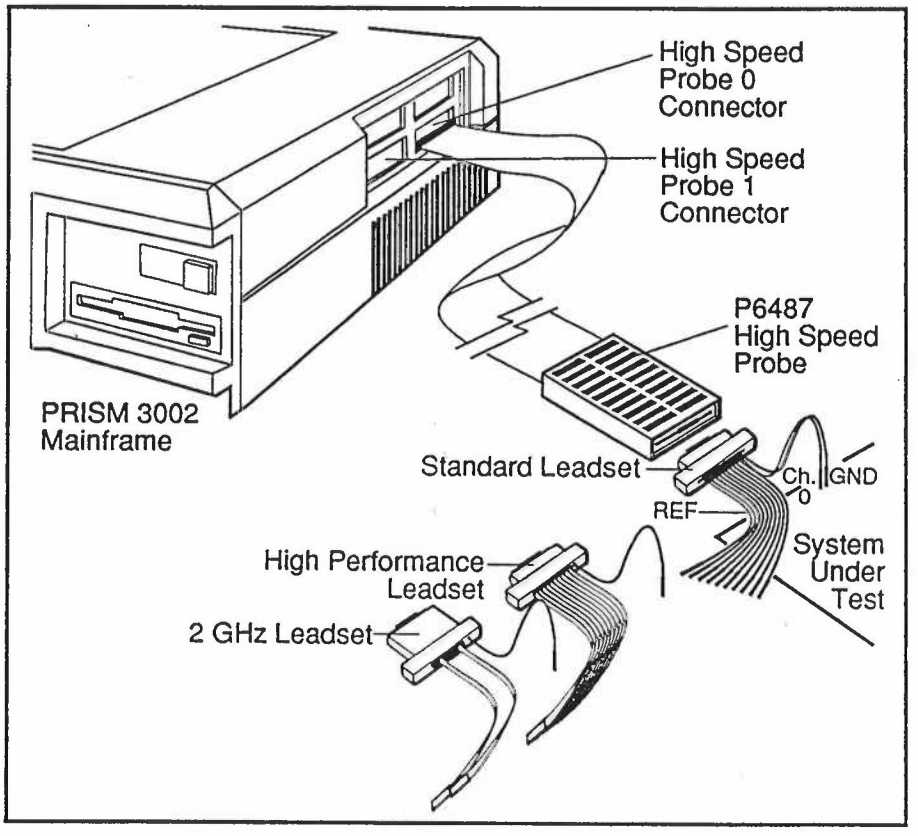

Figure 2-1. HSM-to-SUT connections.

1. Attach the 10 color-coded channel leads to the SUT (see Table 2-1). Refer to Figure 2-3 to see how to use grabber tips with the leads to make connections to the SUT easier.
2. Attach the ground (GND) and reference (REF) leads to the SUT.
3. Connect the leadset to the P6487 probe by aligning the channel numbers and inserting the leadset connector. Be sure the leadset connector is fully seated in the probe and press the probe ID button to confirm the connection.

4. Connect the leadset to the P6487 probe. Orient the channel numbers on the leadset to match those on the probe. Be sure the leadset connector is fully seated in the probe and press the probe ID button to confirm the connection.
5. The PRISM must be powered down before connecting the P6487 to it. Insert the P6487 High-Speed Probe cable connector into one of the two high-speed panel connectors on the mainframe. This panel connector is keyed so that only the P6487 cable connector will fit in it; the P6487 cable connector only fits with the keying tabs oriented toward the top of the connector.

ACQUIRING HIGH-SPEED DATA

The Hardware Analysis setup menu allows you to specify SUT data to acquire and store. You can set up the acquisition to provide you with the exact SUT information you need by selecting from the following features in the Hardware Analysis setup menu:

- acquisition mode
- when to stop acquiring
- memory depth
- number of triggers (number of partitions)
- trigger position in memory
- acquisition threshold voltage
- channel groups (through the Channel Grouping submenu)
- an event
- an action to perform as a result of satisfying the event
- communication links with other modules

To access the Hardware Analysis setup menu, press the Setup key and scroll through the setup menu choices until you reach the Hardware Analysis selection. (You will have more than one Hardware Analysis setup menu if you have more than one HSM installed in your PRISM mainframe or in an expansion system.) Refer to the *P6487 High-Speed Probe* discussion earlier in this section and to your system user's manual for a description of how the various modules are identified.

A default setup allows you to acquire data without modifying the Hardware Analysis setup menu. The following discussion describes this menu's features, functions, and selections.

Figure 2-4 shows the Hardware Analysis setup menu, briefly describes each field, and lists the available selections. The remainder of this section discusses the selections in more detail.

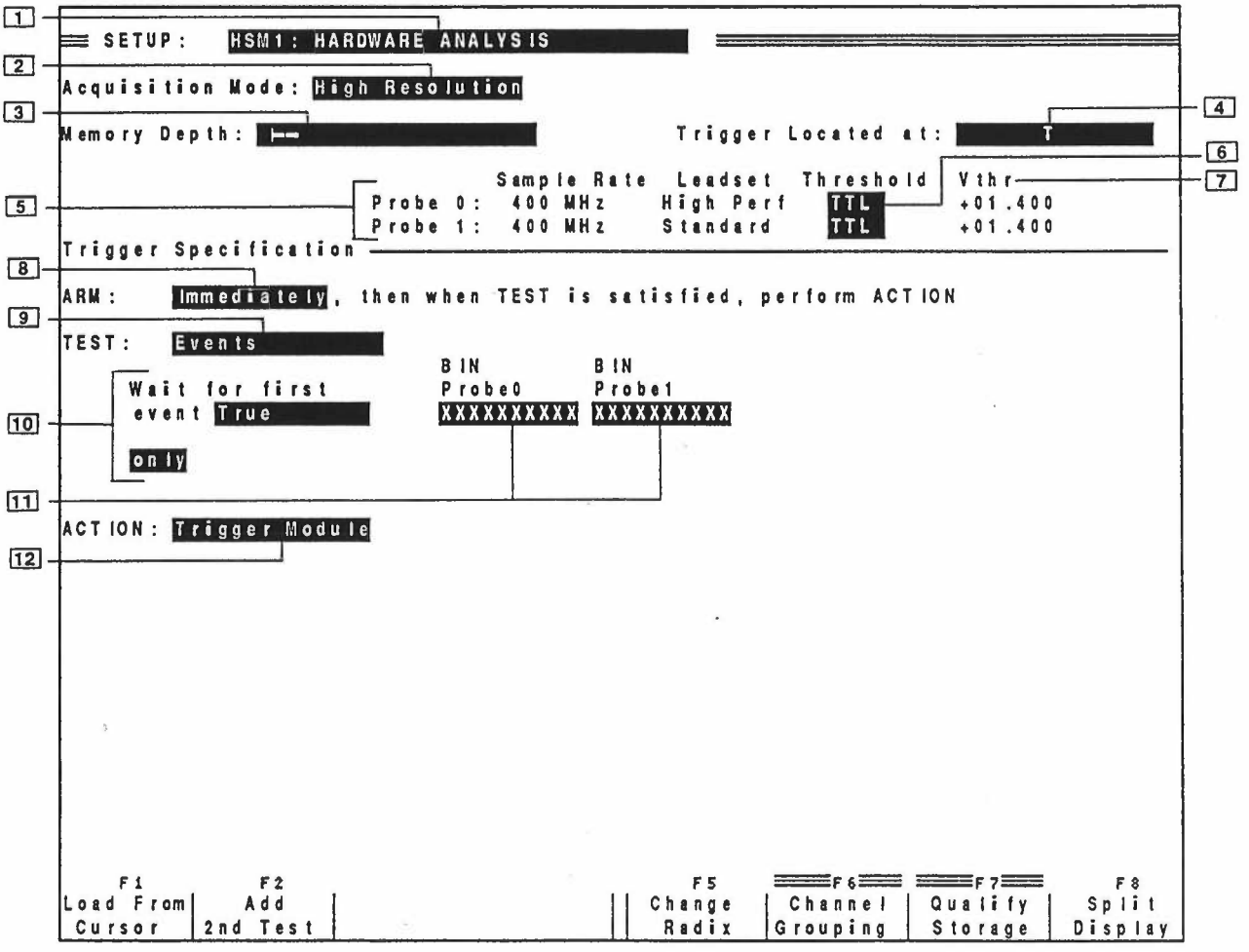

Figure 2-4. Hardware Analysis setup menu.

1 **Menu Select.** Lets you select a menu from the setup menu group.

2 **Acquisition Mode.** Lets you select the overall mode of operation for the module. This determines the method of data sampling. Selections are High Resolution and Dual Threshold. The leadset combined with the acquisition

mode determines the data sampling rate. You may also turn the HSM off in this field.

[3] **Memory Depth.** Lets you select the amount of acquisition memory in which to acquire data. The minimum memory depth is 192; the maximum memory depth is 12,288.

[4] **Trigger Position.** Determines the minimum amount of data stored after the trigger. Five trigger positions are offered.

[5] **Sample Rate, Probe, and Leadset Information.** These information fields show which leadset is connected to each probe and the maximum data sampling rate. The maximum data sampling rate varies depending on the combination of leadset and selected operating mode.

[6] **Threshold.** Lets you specify the logic threshold voltage. Selections are TTL, ECL ,CMOS, and VAR (variable). Variable threshold allows you to enter a value from +10 V to -10 V in increments of 50 mV for the Standard leadset and a value from +5 V to -5 V in increments of 25 mV for the High Performance and 2 GHz leadsets. When operating in the Dual-Threshold mode, both high and low voltage threshold values are provided.

[7] **Threshold Voltage.** This field is normally an information field that shows the voltage setting for the selected threshold. When operating with a 2 GHz leadset, a second column labeled Vref follows the Vthr column. This lets you enter a value for Vthr and Vref from -5 V to +5 V in increments of 25 mV. The default value for Vthr is +1.4 V; the default value for Vref is 0 V.

[8] **Arm.** Lets you specify whether to start searching for the event immediately or to wait until after a TekLink signal (1 or 2) is received from another module.

[9] **Trigger Test Type.** Lets you define the SUT activity that you want to acquire and examine. Selections are Events, Extend Events, Duration, Period, Delay, Accumulate Time, Count, Time While, Setup Time, and Hold Time.

[10] **Trigger Test.** This description and selections vary between tests. Refer to the individual test descriptions later in this section for information regarding the available trigger tests. When the data sample that satisfies the test is found, that data sample is marked in memory as the trigger (if triggering is the selected PRISM action).

[11] **Event Recognizer.** Lets you enter a channel group value (an event) for the HSM to monitor.

[12] **Action.** Lets you specify an action for the PRISM to perform when the test is satisfied. Selections are Trigger Module, Trigger System, Reset Module, Trigger Module and Set Signal (1 or 2), Set Signal (1 or 2), and Do Nothing.

Function Keys

F1: Load From Cursor. Loads the channel group value from the active data cursor in the Display menu. The field cursor must be positioned on a channel group value.

F2: Add 2nd Test/Delete 2nd Test. Adds a second trigger test below the first test. When a second test is already added, F2 can be used to delete it.

F5: Change Radix. Changes the input radix for the channel group on which the field cursor is positioned. Available radixes are binary, octal, hexadecimal, and symbol.

F6: Channel Grouping. Accesses the Channel Grouping submenu.

F7: Qualify Storage. Accesses the Qualify Storage submenu.

F8: Split Screen. Splits the screen into top and bottom panes. When you use the split screen display, this function key toggles between Switch/Unsplit.

Selecting the Acquisition Mode

The acquisition mode sets the overall operation of the module. You can select one of three types of acquisition modes in which to sample data: High Resolution or Dual Threshold. You can also choose to not acquire data by selecting Off.

Qualifying Which Channels Cause Storage (F7)

The HSM stores data for all channels when a transition on any individual channel is detected. The Qualify Storage submenu lets you designate the channels on which you do not want the HSM to store data when a transition is detected. Use a number 1 to mark those channels for which you want the HSM to store data when a transition is detected, and a number 0 or an X to mark those channels for which you do not want the HSM to store data when a transition is detected.

Use F7 to access the Qualify Storage submenu.

The default designation is to store data when any channel changes logic levels (all channels are marked with 1s). Data present on any channel marked with a 0 or X will be acquired when a transition occurs on any channel marked with a 1. Figure 2-34 shows the Qualify Storage submenu. Refer also to *Displaying High-Speed Data* in this section.

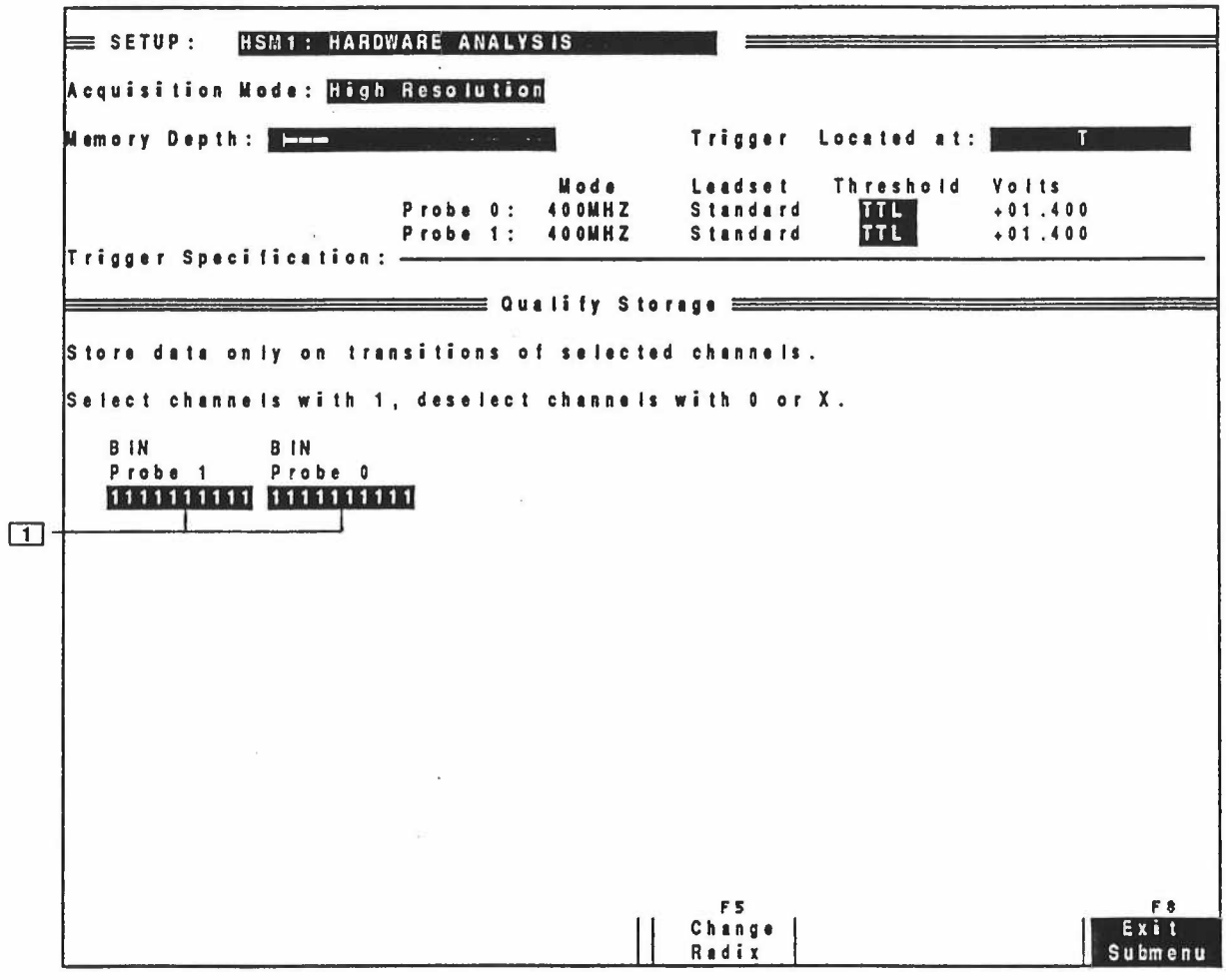

Figure 2-34. Qualify Storage submenu.

[1] **Qualify Storage.** Lets you designate the channels on which you do not want the HSM to detect a transition. Use a number 1 to mark those channels for which you want the HSM to detect transitions, and a number 0 or X to mark those channels for which you do not want the HSM to detect a transition. The default designation is to store the data on all channels when any single channel changes logic levels (transitional memory storage).

Function Keys

F1: Change Radix. Changes the input radix for the channel group field that the cursor is on.

F8: Exit Submenu. Closes the Qualify Storage submenu and returns the display to the Hardware Analysis setup menu.

Arming the HSM

When you "arm" the HSM as part of the trigger specification, you specify the condition that must be satisfied (usually a signal from another module) before the HSM will begin to perform the trigger test. Data is acquired and stored but the test is not started until arming is satisfied.

The arming choices are Immediately, While Signal 1, or While Signal 2. Choosing Immediately allows the HSM to immediately start looking for the event without waiting for a signal. Choosing While Signal 1 or While Signal 2 means that the TekLink signal must be set by another module before the HSM can begin the trigger test.

Defining the Event Recognizer

The event recognizer fields in the Hardware Analysis setup menu let you enter a value for each channel group. The HSM compares each data sample as it is acquired against these channel group values. The result determines if the event recognizer is satisfied.

The 0-F, X, and M terms are ANDed together. To satisfy the event recognizer, all data channels must match the specified event recognizer value.

The U and G terms are ORed together. Only one of the channels marked with an U or G need be true to satisfy the event recognizer.

Appendix B: SPECIFICATIONS

This section lists two types of specifications: (1) those that are classified as environmental, physical, or "static" specifications (specifications that cannot be verified by the user); and (2) those that are actual operational parameters (specifications that are user-verifiable).

The following terms are used in the specification tables:

Characteristic: A property of the product.

Performance Requirement: The primary performance characteristics of the product that can be verified using verification procedures.

Supplemental Information: Statements that describe typical performance for characteristics of secondary importance (those that are not usually verified using verification procedures) or statements that further explain related performance requirements.

CHARACTERISTICS/SPECIFICATIONS

The performance characteristics in this section are valid under the following condition:

1. The 30HSM Acquisition Module and P6487 High-Speed Probe must be operating in an environment as specified in Table B-1 of the applicable mainframe service manual.
2. A warm-up period of at least 20 minutes must precede the verification/operational procedures.

The following tables list the specifications and performance characteristics of the 30HSM Acquisition Modules, P6487 High-Speed Probe, and associated leadsets.

Table B-1
30HSM FUNCTIONAL REQUIREMENTS

Characteristic	Description
Number & Type of Probes supported	2, P6487 High-Speed Probe
Number of Channels per Probe Standard & High Performance Leadsets 2 GHz Leadset	 10 channels in High Resolution & Dual-Threshold modes 2 channels in High Resolution mode only
Acquisition Rate High Resolution acquisition mode Dual-Threshold acquisition mode	 400 MHz 200 MHz
Acquisition Memory Size	12,288 memory locations (for data and timestamps)
Depth	A single memory can fill all, 1/2, 1/4, 1/8, 1/16, 1/32, or 1/64.
Trigger Mode Enhanced Trigger Immediate	 If the trigger occurs before the prefill is satisfied, the unfilled prefill locations will be used for additional postfill.
Trigger Position	One of five user-selectable positions
Storage Qualification	Transitions on any channel qualified for storage (marked with a 1 in the Qualify Storage submenu) causes the storage of one data sample in memory. Channels can be unqualified (marked with a 0 or X) by the user and are unqualified automatically if they are not used in the Channel Grouping submenu.
Arm	Immediately or on a selected TekLink signal
Number of Trigger Tests	2
Trigger Tests Counter Range Timer Range	 1 to over 2.25 10^{15} 2.5 ns to over 65 days (5.625 million seconds) with 2.5 ns resolution in High Resolution mode and 5 ns resolution in Dual-Threshold mode
Actions	Trigger module, trigger system, reset module, set signal, trigger module and set signal, or do nothing

Table B-2
30HSM PERFORMANCE REQUIREMENTS

Characteristic	Performance Requirement	Supplemental Information
TekLink Clocks M_CLK S_CLK	 50 MHz 12.5 MHz	 Generated by MPU board Refer to MPU specifications
Power Supplies +5 V(Vcc), +12 v, -12 V +3 V sink +1.6 V sink		Module receives power from mainframe. Refer to your mainframe specifications.
VL, VH, and VTH Lines from the HSM module Voltage Range Step Size DAC Range Relationship Output Current	 0 to 8.53V 25 mV 0 to 4,095 0 on DAC = 0.0 volts -10 mA to +10 mA	 independently programmable 25 mV = 12 AC steps 12-bit binary
System Trigger Pulse Width	160 ns minimum required	
SIGNAL (1-4) TekLink lines Pulse Width	80 ns minimum required	

Table B-3
30HSM ENVIRONMENTAL SPECIFICATIONS

Characteristic	Description	Supplemental Information
Temperature Operating Non-operating	 0° to +50° C -55° to +75° C	Meets MIL-T-28800D, class 5
Thermal Switch Threshold	85° C	Switch closes when temperature exceeds 85° C
Relative Humidity	20% to 95% (Estimated)	Exceeds MIL-T-28800D, class 5
Altitude Operating Non-operating	 15,000 ft (4.5 km) 50,000 ft (15 km)	Exceeds MIL-T-28800D, class 3
Vibration	.015" (0.380 mm) @ 10 Hz to 55 Hz	Meets or exceeds MIL-T-28800D, class 5
Shock	30 Gs @ 11 mS	MIL-T-28800D, class 3
Packaged Product Vibration and Shock	1" (25 mm) @ 270 RPM	

Table B-4
30HSM PHYSICAL SPECIFICATIONS

Characteristic	Description
Product Dimensions Length Width Weight	 15.00" (38.10 cm) 9.25" (23.49 cm) 1.60 lbs. (0.73 Kg) approximate weight

Table B-5
30HSM SAFETY AND REGULATORY SPECIFICATIONS

Characteristic	Description
Electromagnetic Compatibility (EMI) without probes	Complies with VDE 0871, Level B
Safety	Complies with UL 1244, CSA 556B, IEC 348

Table B-6
30HSM RELIABILITY SPECIFICATIONS

Characteristic	Description
Mean Time Between Failure	Failure rate <1 per 10,000 hours (calculated), excluding probes and leadsets

Table B-7
P6487 HIGH-SPEED PROBE FUNCTIONAL REQUIREMENTS

Characteristic	Description
Channels	10
Acquisition Rate Transitional	 400 MHz (2.5 ns resolution) max. (single threshold) 200 MH z (5 ns resolution) max. (dual threshold)
Glitch Latch	Dual-Threshold mode only
Operational Modes Acquisition Modes Diagnostic Modes	 High Resolution and Dual-Threshold Test Pattern Generator

Table B-14
STANDARD LEADSET PERFORMANCE REQUIREMENTS

Characteristic	Performance Requirement	Supplemental Information
Input Resistance		165 kΩ nominal connected to the P6487 probe
Input Capacitance		<11 pF
Reference Range	±25 V	
Input Threshold Range Threshold Accuracy Step Size	±10 V ±100 mV 50 mV	
Input Voltage Range	±12 V from threshold	
Minimum Overdrive	500 mV	
Maximum Non-Destructive Input Voltage Range	±50V	
Minimum pulse width	5.0 ns to capture and trigger	Single channel operating in High Resolution mode
	7.5 ns to capture and trigger	Single channel operating in Dual Threshold mode
	6.0 ns to capture and trigger	Across all channels of a single P6487 probe operating in High Resolution mode
	8.0 ns to capture and trigger	Across all channels of a single P6487 probe operating in Dual Threshold mode
	5 ns minimum glitch width	Operating in Dual Threshold mode

Table B-15
STANDARD LEADSET ENVIRONMENTAL SPECIFICATIONS

Characteristic	Description	Supplemental Information
Temperature Operating Non-operating	 -15° to +55° C -62° to +85° C	Meets MIL-T-28800D, class 3
Thermal Switch Threshold	85° C	Switch closes when temperature exceeds 85° C
Relative Humidity	5% to 95% (Estimated value)	Exceeds MIL-T-28800D, class 3
Altitude Operating Non-operating	 15,000 ft (4.5 km) 50,000 ft (5 km)	Exceeds MIL-T-28800D, class 3
Vibration	0.25" (0.64 mm) @ 10 to 55 Hz P-P for 75 minutes total	Meets or exceeds MIL-T-28800D
Shock	50 Gs	

Table B-16
STANDARD LEADSET PHYSICAL SPECIFICATIONS

Characteristic	Description
Leadset Dimensions Case Length Case Width Case Height Lead Length	 3.0" (7.62 cm) 1.5" (3.81 cm) 0.7" (1.78 cm) 9.0" (22.86 cm)
Weight	2.0 oz. (56.8 g)

Table B-17
HIGH PERFORMANCE LEADSET FUNCTIONAL REQUIREMENTS

Characteristic	Description
Number of Channel Conductors	10
Number of Reference Conductors	10
Number of Ground Conductors	1

Table B-18
HIGH PERFORMANCE LEADSET PERFORMANCE REQUIREMENTS

Characteristic	Performance Requirement	Supplemental Information
Input Resistance		102 kΩ nominal connected to the P6487 probe
Input Capacitance		<11 pF
Reference Range	-10 V to +15 V	
Input Threshold Range Threshold Accuracy Step Size	±5 V ±50 mV 25 mV	
Input Voltage Range	±6 V from threshold	
Minimum Overdrive	250 mV	
Maximum Non-Destructive Input Voltage Range	±50V	
Minimum pulse width	4.5 ns to capture and trigger 6.5 ns to capture and trigger 5.0 ns to capture and trigger 7.0 ns to capture and trigger 2.5 ns minimum glitch width	Single channel operating in High Resolution mode Single channel operating in Dual Threshold mode Across all channels of a single P6487 probe operating in High Resolution mode Across all channels of a single P6487 probe operating in Dual Threshold mode Operating in Dual Threshold mode

Table B-19
HIGH PERFORMANCE LEADSET ENVIRONMENTAL SPECIFICATIONS

Characteristic	Description	Supplemental Information
Temperature Operating Non-operating	 -15° to +55° C -62° to +85° C	Meets MIL-T-28800D, class 3
Relative Humidity	5% to 95% (Estimated value)	Exceeds MIL-T-28800D, class 3
Altitude Operating Non-operating	 15,000 ft. (4.5 km) 50,000 ft. (15 km)	Exceeds MIL-T-28800D, class 3
Vibration	0.25" (0.64 mm) @ 10 to 55 Hz P-P for 75 minutes total	Meets or exceeds MIL-T-28800D
Shock	50 Gs	

Table B-20
HIGH PERFORMANCE LEADSET PHYSICAL SPECIFICATIONS

Characteristic	Description
Leadset Dimensions Case Length Case Width Case Height Lead Length	 3.0" (7.62 cm) 1.5" (3.81 cm) 0.7" (1.78 cm) 9.0" (22.86 cm)
Weight	2.0 oz. (56.8 g)

Table B-21
2 GHz LEADSET FUNCTIONAL REQUIREMENTS

Characteristic	Description
Number of Channel Conductors	2
Number of Reference Conductors	2
Number of Ground Conductors	1

Table B-22
2 GHz LEADSET PERFORMANCE REQUIREMENTS

Characteristic	Performance Requirement	Supplemental Information
Input Resistance	20 kΩ nominal	20 kΩ nominal connected to the P6487 probe
Input Capacitance	2.5 pF	2.5 pF
Reference Range	-5 V to +5 V	
Input Threshold Range Threshold Accuracy Step Size	±5 V ±35 V 25 mV	
Input Voltage Range	±6 V from threshold	
Minimum Overdrive	200 mV	
Maximum Non-Destructive Input Voltage Range	±15 V	
Minimum Pulse Width	2.5 ns to capture 4.5 ns to trigger 5.0 ns	Pulse widths <7.5 ns may display more then one transition on the trailing edge of the pulse Single channel Across both channels of a single P6487 probe

Table B-23
2 GHz LEADSET ENVIRONMENTAL SPECIFICATIONS

Characteristic	Description	Supplemental Information
Temperature Operating Non-operating	 -15° to +55° C -62° to +85° C	Meets MIL-T-28800D, class 3
Relative Humidity	5% to 95% (Estimated value)	Exceeds MIL-T-28800D, class 3
Altitude Operating Non-operating	 15,000 ft (4.5 km) 50,000 ft (15 km)	Exceeds MIL-T-28800D, class 3
Vibration	0.25" (0.64 mm) @ 10 to 55 Hz P-P for 75 minutes total	Meets or exceeds MIL-T-28800D
Shock	50 Gs	

Table B-24
2 GHz LEADSET PHYSICAL SPECIFICATIONS

Characteristic	Description
Leadset Dimensions Case Length Case Width Case Height Lead Length	 3.0" (7.62 cm) 1.5" (3.81 cm) 0.7" (1.78 cm) 9.0" (22.86 cm)
Weight	2.0 oz. (56.8 g)

Table B-25
STANDARD, HIGH PERFORMANCE, AND 2 GHz LEADSET
SAFETY AND REGULATORY SPECIFICATIONS

Characteristic	Description
Safety	Complies with UL 1244, CSA 556B, when used with a PRISM 3000 Series Mainframe
Electromagnetic Compatibility (EMI)	Probes are exempt from VDE per German Postal Regulation 1046/1984 Par. 2, Sect. 1.7.1

Table B-26
STANDARD, HIGH PERFORMANCE, AND 2 GHz LEADSET
RELIABILITY SPECIFICATION

Characteristic	Description
Mean Time Between Failure	20,000 hours (calculated value)

L

M

P

Q

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Instructions

V1.0 to V1.1 System Software Update

For PRISM 3001 and 3002 Mainframes

This instruction sheet describes the differences between Version 1.0 and Version 1.1 of the PRISM System Software.

If you received this update as part of a system software upgrade package, you will need to perform the installation instructions provided in this instruction sheet.

If you received this disk as part of a new system purchase, Version 1.1 was installed on your system at the factory and you can disregard these installation instructions. However, we suggest that you retain this instruction sheet in the installation section of your system user's manual for future reference.

V1.0 TO V1.1 DIFFERENCES

The following problems have been fixed in Version 1.1:

- Typing a period (.) in a word recognizer field will not crash the system.
- Pressing any key while the PRISM mainframe is booting will not crash the system.
- Scrolling the timing diagram will not crash the system.
- The system rewrites the display if you press either the AUTO or CONT keys while in a display submenu.
- If the cursors are linked at the start of an acquisition, they will be unlinked when the acquisition is complete.
- While performing a search, if any key other than the X is pressed (to abort the search) followed by the X, the search will terminate.
- Online help Notes are available from the Menu Map.
- You can restore symbols for 32-bit wide channel groups.
- You can make field selections by typing a match string.

INSTALLING VERSION 1.1 ON A HARD DISK

Refer to page 6-21 of the *PRISM 3002 System User's Manual* and the following procedure to install Version 1.1 on a hard disk.

1. Power up your PRISM mainframe. The System Configuration menu displays.
2. Select the Disk Services menu using the Select keys.

070-8009-00
PRODUCT GROUP 5E

FIRST PRINTING MARCH 1990

3. Move the cursor to the Select Operation field and select the *Install System* operation.
4. Insert the disk labeled PRISM 3000 System SW, Version 1.1 into the floppy disk drive.
5. Press function key F1 to start the installation procedure. A message at the top of the display will tell you when the installation is complete.

Note

Be sure to archive this new version of PRISM system software with your Version 1.0 disks.

USING VERSION 1.1 WITH A FLOPPY DISK

Refer to page A-9 of the *PRISM 3001 System User's Manual* or page A-14 of the *PRISM 3002 System User's Manual* and the following procedure to use Version 1.1 on a floppy disk

1. Insert the disk labeled PRISM 3000 System SW, Version 1.1 into the floppy disk drive.
2. Power up your PRISM mainframe.
3. After you load the system software, you will be prompted to insert the Application Software disk. You must press the Return key after inserting the disk to continue. A message appears when the software is successfully loaded.

Note

Be sure to archive this new version of PRISM system software with your Version 1.0 disks.

KNOWN V1.1 PROBLEMS

The following problems exist in Version 1.1 of PRISM 3000 System Software.

Symbols

You must have the same channel grouping when you restore a symbol table to a module as when that symbol table was originally created.

If the module contains more than one section (i.e., the 30MPX module contains both a State Section and a Timing Section), both sections must have the same channel grouping they had when symbols were created before symbols can be restored to either section. For example, to restore symbols to the Timing Section, both the State Section and the Timing Section must have the same channel grouping as when the symbols were created.

Restoring Setups from Floppy Disks

To restore setups from floppy disks, both the application software and the setup file must reside on the same disk.

Data Cursor Locations After Acquisitions

When data is acquired and displayed, PRISM tries to keep the data cursor locations in the State Table and Timing Diagram Display menus in the same positions as for the previous data display. For example, if the data cursor is on location -10 in the State Table and you press Start to take a new acquisition, the cursor will still be at location -10 in the new data display. This is convenient as long as there is data at location -10.

If the new acquisition doesn't contain any data at the location occupied by a data cursor, the location won't be displayed and the behavior of the data cursors changes. The Timing Diagram menu and the State Table menu use different methods to track cursor location, so they don't behave the same after an acquisition is made that contains no data at the cursor location.

In the Timing Diagram Display menu, the data cursors remain at the same positions in time even if there is no data stored in that position. This can cause a cursor to be positioned outside of any data. Also, the Load from Cursor operation in any menu will fail because there is no data at the cursor position to load. If you move the scroll knob, the cursor jumps to the next location containing data. The jump can be in either direction, depending on which direction you turned the knob.

In the State Table Display menu, the data cursors must always be displayed. So, if there is no data stored at the previous cursor location after a new acquisition is taken, the cursor moves to the next location containing data and that becomes the new cursor location. However, because the Cursor ▲ tracks time rather than locations, it doesn't automatically change to match the location until the knob is moved. In other words, if a data cursor is automatically repositioned during a data acquisition, the Cursor ▲ field may not match the location of the cursor in the data display. Likewise, the Load from Cursor operation will see the old (currently empty) location and will fail unless the Cursor ▲ has been updated.

The behavior of the cursors in the State Table is complicated when data is displayed in some disassembly display modes. For example, if the cursor is on location 80 and the data display mode is changed to Software mode, location 80 may no longer be displayed. In this case, the cursor moves to the next displayed location (for example, to location 81) . But, the Cursor ▲ doesn't get updated unless you manually move the cursor. The Load from Cursor operation loads the data from the location indicated by the Cursor ▲.

Searches and Screen Updated with Memory Differences Enabled

When using the Mem Diff (F5: Search Definition submenu from either the State Table or Timing Diagram display menus) and changing the display of a large acquisition, the PRISM system does not seems to respond. The PRISM system is not unresponsive when this occurs; it is merely reprocessing the data for Mem Diffs. Currently, no message shows to tell you of the reprocessing operation. The delay for reprocessing is between 2 and 3 seconds for a 30MPX with maximum memory depth. However, the delay can as long as 10 to 15 seconds for a 30HSM with maximum memory depth.

Restore Instrument Setups Containing Performance Analysis

A PRISM 3000 can crash or hang after an instrument setup file that contains Performance Analysis is restored. Therefore, Performance Analysis should be loaded only if you are using it. You may also want to remove PA from the SUPPORT directory on the hard disk to prevent it from auto-loading at power up.

Select Fields

You can make field selections by typing a match string. This changes the selection each time a character is entered until a match is found. For example, if you select a field where the selections were SETUP-1, SETUP-2, SETUP-3, and SETUP-4, typing an S in the field would select SETUP-1. Typing an E changes the selection to the next matching selection, SETUP-2. Typing a T changes the selection to SETUP-3 and so on.

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Release Notes

Product Name: PRISM Hardware Analysis Module
Product Line: PRISM 3000 Series Logic Analyzers
Nomenclature: 30HSM or 3001HSM
Version: V1.2

VERSION DIFFERENCES AND ENHANCEMENTS

The 30HSM Application Software was modified for compatibility with PRISM System Software Version 2.x. There are no other functional differences from the previous release of 30HSM software.

INSTALLATION NOTES

The 30HSM software is compatible with the PRISM System Software Version 2.0 and up, and supports the Synchronous acquisition mode.

OPERATIONAL NOTES

The following notes describe functions associated with this version of software that can affect how you use the PRISM system. The listed functions are high-impact or frequently-seen problems. You should keep these release notes in the Change Information section following the yellow divider page at the rear of the manual.

Probe/Leadset Configuration

Restoring Instrument Setup from HSM Configuration. Restoring setups made with 30HSM application software V1.0 is not supported.

Also, if your previous PRISM configuration included a 30HSM module, with 30HSM software V1.1, you should avoid restoring instrument setups made with this configuration. It is possible, under certain conditions, to generate an irrecoverable system error when using these old instrument setups. (The conditions that cause failure are related to the leadset. Restoring an old setup to a system where the leadset is different or has been removed can lead to an irrecoverable error, requiring that you cycle power to the system.)

You should restore instrument (or module) setups created with the current versions of software.

Changing the leadset configuration can affect the channel grouping. Any change to the leadset configuration when the Synchronous mode probe adapter is attached will change the channel grouping defined for the module. Synchronous mode is only available when both probes are attached and a high-performance leadset is attached to each probe. Attaching and removing a leadset when the module is in this configuration will clear all groups and symbols, and revert to default grouping.

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Setup menu must be re-entered after changing a leadset. When you change a leadset, you must reconfigure the hardware in the Setup menu (entering the Setup menu accomplishes the reconfiguration).

Triggering and Acquiring Data

Inter-module signals (TekLink) are not latched by the module. The 30HSM does not latch TekLink signals. In the MPX: State section, these signals are only set until the memory of the module asserting the TekLink signal is finished post-filling its memory. To assure that the TekLink signal is recognized by the 30HSM, set the action of the asserting module to extend the post-fill time. You can extend the post-fill time of the acquisition indefinitely by performing the Do Nothing action.

Word Recognizers

Middle data loaded from cursor when in High-Resolution mode. Middle data from a previous Dual-Threshold mode acquisition can be entered into a word recognizer when the module is in High-Resolution acquisition mode if the Load From Cursor function key is used. Such values should be changed to Don't Cares before starting an acquisition.

Word recognizer scrolling unexpected. The word recognizers in the 30HSM Setup menu may scroll unexpectedly if many groups are defined and are scrolled off the screen to view other groups. If the cursor is positioned on the last group on the right side of the screen, then is moved past that position by using the Next key and then back to the word recognizer, the cursor may appear to be positioned on a group other than the last group in the word recognizer. If you open Notes or change menus and return to the setup menu, the cursor is positioned on the last group. Any other action is executed at the current cursor location.

Timing Diagram Data Display

Initial delay in displaying timing traces. There can be an initial delay of up to one minute when compressed timing traces are being displayed. No message is displayed and no other actions can be taken.

Symbols

Range Symbols. In the Setup menu, the PRISM interprets range symbols as the symbol's lower bound only, not the entire range assigned to that symbol.

UPDATE ON SOFTWARE FUNCTIONS

The following notes describe functions associated with this release of the PRISM System Software. The listed functions are high-impact or frequently-seen problems.

Probe/Leadset Configuration

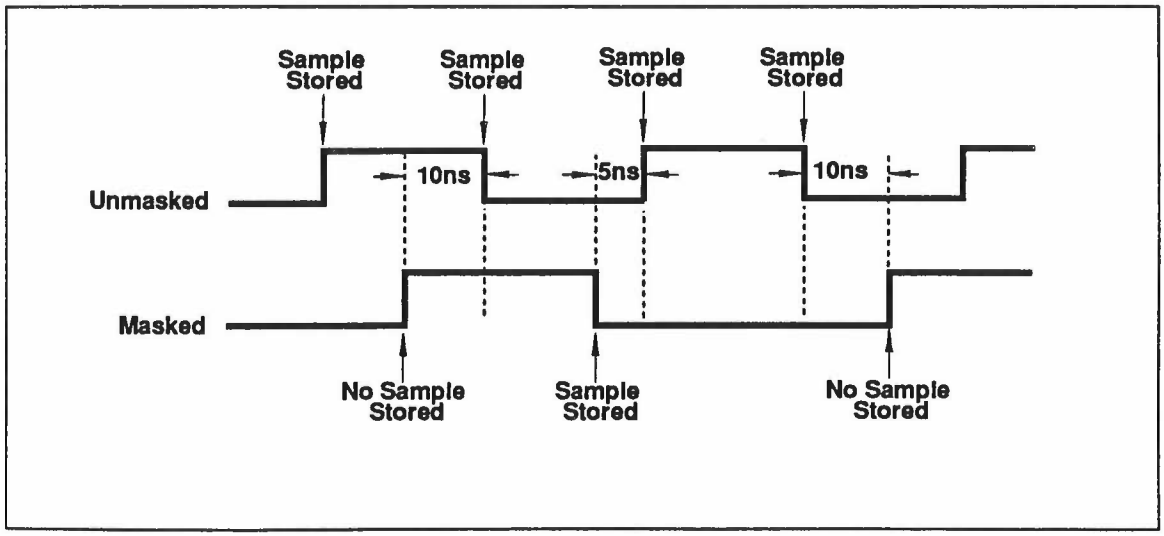
Warning displayed for 10 seconds when unable to restore a setup. A warning message displays for 10 seconds when the system cannot restore a setup because the current module probe and leadset connections do not match the connections of the saved setup. The message tells you which probes and leadsets must be attached to restore the setup. An example of this message is, "HSMx setup not restored. Setup requires Probe0: Standard and Probe1: none."

When restoring a setup that uses the Synchronous acquisition mode, the message says "HSMx setup not restored. Attach (or Remove) Sync Probe Adapter to restore setup." After the message is displayed, another message appears that says the setup failed to restore.

Unexpected probe ID message displayed. When only one probe and leadset is attached to the Synchronous mode probe adapter, this message displays, "HSMx: Probe 0 with no leadset." Pressing the probe ID after both probes and leadsets are attached causes the appropriate message to display, "HSMx: Probe 0 with High Performance leadset."

Triggering and Acquiring Data

Samples with no transitions displayed when qualify storage is used. You can use the Qualify Storage menu to mask some channels so that transitions on those channels do not cause a sample to be stored. However, if a transition occurs on a masked channel within 5 ns of a transition on an unmasked channel, then a sample will be stored even though a transition may not have occurred on an unmasked channel. This is shown in the following figure.



You may see two samples in a row where there were no transitions on the unmasked channels in the State Table. All data acquired is accurate even though there is an occasional extra sample caused by a transition on a masked channel.

The Trigger System action in either test triggers the system. When the actions Trigger the Module and Trigger the System are both selected in a two-test setup, the Trigger the System action is performed regardless of which test is satisfied.

Edge detection is no longer available in extend events test. The Extend Events test will test for only True and False word recognizer conditions. Going True and Going False are no longer available.

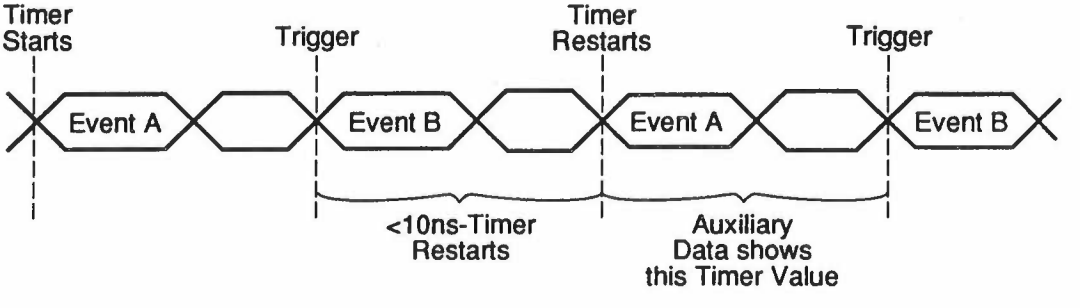
No warning displayed for extended events in some cases. No warning message is displayed when you select the Extend Events test for two tests and use the same signal in each test. For example, you could select to extend events on Signal 3 for both the first and second tests. In this case, the module will not trigger.

No warning message is displayed if the signal used in the Arm or Action clause of a test is the same signal as the signal selected in the Test. For example, if While Signal 2 is selected in the Arm portion of the first test, and the Only selection within the Extend Events test is changed to Then, Signal 2 appears as the default signal selection for the second word recognizer and no warning message displays.

Measurements

First sample time may be 2.5 ns after the trigger. The TRIG (trigger indicator) displayed in the State Table display may be 2.5 ns after the actual trigger because of the way that data is sampled by the PRISM in conjunction with the data rate of the system under test.

Timer measurements are restarted after triggering in some cases. For any of the timer tests (Delay test, Accumulate Time test, Period test, etc.), if the first event (starts the timer) occurs within 10 ns after the trigger event (second event), the timer starts another measurement. The value in the Auxiliary Data Display submenu will show the time from that second occurrence of the first event to the second trigger event. Correct values are displayed in all other menus. Refer to the following figure.



Timer measurements can be 0 picoseconds in some cases. The results of timer test measurements can be displayed as 0 ps in the Auxiliary Data submenu when both word recognizers of a single test are used, and the condition that satisfies the second word recognizer also satisfies the first word recognizer.

For example, if a timer test is waiting for the first word recognizer to see the value 01 going true in data, then waiting for the second word recognizer to see the value 11 going false in data, both the word recognizers will be satisfied if the second test sees the value 01 following the value 11. In this situation, the module will trigger as expected but a time of 0 ps will be displayed as the measurement of the test.

Word Recognizers

The second word recognizer is single threshold in Dual-Threshold mode. When operating in the Dual-Threshold mode, the second word recognizer only has a single threshold whose value is set to Vhigh (the upper threshold value in Dual-Threshold mode). When triggering on an event with 1's in the second word recognizer, that recognizer will see both 0's and M's as being below the threshold. Similarly, when triggering on an event with 0's in the second word recognizer, that recognizer will again see both 0's and M's as being below the threshold.

Some values are unavailable for symbol definition. Symbol values cannot be defined with middle state (M), glitch (G), unstable (U), or fourth state data.

State Table Data Display

The last sample is duplicated in the State Table. The last sample of data in the State Table display is duplicated so that you can see the duration of the sample.

Blank sample displayed at the end of synchronous data. A blank sample (all dashes) is displayed as the last sample in a synchronous acquisition. This allows the display of the duration of the actual last sample. The blank sample may be displayed as a series of fourth-state characters when synchronous data is viewed in Symbol radix.

Auxiliary Data

No auxiliary data for the Hold Test. No timer data is displayed in the Auxiliary Data Display submenu for the predefined Hold Time test.

Auxiliary data is uninitialized before the first acquisition. The counter/timer values (viewed in the Auxiliary Data Display submenu) may not be zero if viewed before running the first acquisition after powering up the system.

Timing Diagram Data Display

Improved timing trace scrolling. You can scroll through timing traces more quickly in the Timing Diagram. Occasionally, you may see the message, "Post-processing HSM data..." displayed while scrolling and experience a momentary pause while the message is displayed.